

Survey And Isolation Of *Klebsiella Pneumoniae* From Clinical Samples Of Bagalkot District

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Abstract

The *klebsiella pneumoniae* is the most prevalent species isolated from hospitalized patients and it is most prevalent from in patient's isolates in a laboratory-based surveillance. The survey is an important study the spared of the infection in given location. Keeping Bagalkot district as the area of spared we try to study infection. In present study, 350 clinical samples were isolated from different places of Bagalkot district, for convenience, five Zones are made; namely A, B, C, D and E. Out of 350 clinical samples, 230 from males and 120 from females were collected. After performing all biochemical tests 180 isolates were confirmed as *Klebsiella pneumonia*. The rate of infection high in Bagalkot district. Out of 180 positive isolates, the incidence rate was more in sputum sample 76.00%, followed by 18 %, in blood, 6% in urine samples. The survey report also shows the percentage of incidence was more in the age group of above 40 (66.43%) years and age group between 8 to 18 (56.12%) years.

1. INTRODUCTION

Klebsiella pneumoniae is a facultative anaerobic gram negative bacteria when observed under simple microscope and has large round and greenish-yellow colonies often with haemolysis were observed when grown on blood agar plates a small percentage of *klebsiella pneumoniae* can be differentiated from most other *pneumonia* by the coagulase test, *klebsiella pneumoniae* is primarily coagulase-positive because it can produce the enzyme coagulase that causes clot formation. It causes superficial skin lesions such as boils and furuncles: more serious infections such as pneumonia, lung infection,

meningitis, and liver infection urinary tract infections. *klebsiella pneumoniae*. *klebsiella pneumoniae* infections may spread through water infection food infections. [1] Deeply penetrating *klebsiella pneumoniae* infections can be severe. Prosthetic joints put a person at particular risk for septic arthritis, colonization or infection in the hospital include prior antibiotic exposure, admission to an intensive care unit, surgery, and exposure to an multi drug resistance *klebsiella pneumoniae* colonized [2]. The focus of this work is to isolate and identify spread of infection in hospitals admitted community. The work is progressed with isolation of bacteria from patients and enumeration of bacteria in primary health centers and admitted patients will able to understand disease. After isolation we try to find its epidemiological spread and we try to distribute the isolate in different zone wise survey and how the infection is spread in different age group. The penicillin for medical use, the first penicillin-resistant *klebsiella pneumoniae* isolates were observed. Since 1960, approximately 70% of all *klebsiella pneumoniae* isolates have been penicillin-resistant [3]. In addition, *klebsiella pneumoniae* developed resistance in, 1981 only three years after its introduction.

2. MATERIALS AND METHODS

2.1. Sample Collection Zones

Isolation and study of epidemiology of *klebsiella pneumoniae* from the infected patients were chosen from five places of Bagalkot district, Karnataka. The Bagalkot district temperature varies between 25 to 43° C. The places were classified in to five Zones as A (District Govt. Hospital, Bagalkot), B (Sri Hangal Kumareshwara Hospital and Research Centre, Bagalkot), C (Miskin Diagnostic Laboratory) D (Govt. Hospital Ilkal) and E (Govt. Hospital Jamakandi). Clinical samples were collected regularly from above mentioned places during March 2013 to December 2015.

2.2. Isolation of *klebsiella pneumoniae* from different clinical samples

2.2.1. Collection of Samples

The clinical samples were collected from the patients who were infected with *klebsiella pneumoniae* in and around Bagalkot region of Karnataka state, India. The clinical specimens like sputum, cerebrospinal fluid (CSF), blood, urine, biomedical waste were selected as the sources of organisms and carried in 18.2% peptone water to the laboratory. Nutrient agar and *Klebseilla* selective media for primary isolation of the *klebsiella pneumoniae*

2.2.2. Media used for isolation and Characterization of *klebsiella pneumoniae*:

For the present study different culture media like, Nutrient agar, *Klebseilla* selective media and Blood agar were used. Nutrient agar/broth was prepared for the appropriate growth of *klebsiella pneumoniae* culture, which could be the source of the strains for inoculation in subsequent steps plates were prepared and streaked; the inoculations could be done either from the peptone water containing organisms or from the nutrient broth culture. The blood agar ingredients were dissolved and autoclave at 121° C for 15 min. Cool to 45-50 ° C and 50 ml of sterile defibrinated sheep blood was added aseptically.

Mixed thoroughly, avoiding accumulation of air bubbles and immediately poured into sterile petri plates.

2.3. Colony Characterization and Microscopic Observation

Isolated colony from selective media was picked up and prepared the smear on grease free glass slides, which was dried and heat fixed. Gram-staining was performed according Christiana Gram which allows better differentiation of organisms.

2.4. Biochemical Characterizations of *klebsiella pneumoniae*

For the characterization of isolates, HI Staph Identification kit from Hi-Media Mumbai was used. For biochemical tests, control organisms were used and procured from IMTECH, Chandigarh, India. A set of biochemical tests were performed that would confirm *klebsiella pneumoniae* strains among the isolates. Tests were performed in order to characterize the *klebsiella pneumoniae* in respect to various biochemical properties.

3. RESULTS

3.1. Isolation and Characterization of *klebsiella pneumoniae*

The present investigation was carried out during the period from March 2013 to December 2015. During this period of time epidemiologically important *klebsiella pneumoniae* was isolated from different clinical samples. An effort was made to collect the sample from five different places of Bagalkot region. For convenience, places were classified into five Zones. Total of 350 clinical samples, from 230 males and 120 females were collected. For isolation and identification of *klebsiella pneumoniae*, samples were inoculated on to the selective medium and study its characteristics. Distinguishing colonies grown on both media at 37⁰C were picked and confirmed by microscopic and biochemical characterization. Out of 350 clinical samples inoculated, 180 strains were confirmed as *klebsiella pneumoniae* and were further characterized. Out of 180 samples, the overall rate of incidence observed in both male and female is 64% and 36 %, respectively.

3.2. Survey of *klebsiella pneumoniae*

In the present study, the incidence of *klebsiella pneumoniae* were distributed Zone wise and age group wise, are presented in the following sections

3.2.1. Zone wise incidence of *klebsiella pneumoniae*

The incidence of *klebsiella pneumoniae* of different Zones. It is evident that the incidence of *klebsiella pneumoniae* colonization is very high in Zone-D 72.00% followed by Zone-E 66.66%. In Zone-A 62.5% isolation rates were observed. The lowest rate of incidence was observed in Zone-C and Zone-B with 53.76% and 52.85% respectively [5].

3.2.2. Age wise incidence of *klebsiella pneumoniae*

The age wise incidence of *klebsiella pneumoniae* colonization of each Zone there was a clear indication of the increase in *klebsiella pneumoniae* incidence with age more than 40 years and between 5-18 years when compared to that age group 18-40 years in both male and female individuals. In Zone-A, maximum rate of *klebsiella pneumoniae* incidence was

recorded in > 40 years (72.22%) age group followed by 5-18 years (60.00%) and minimum incidence was recorded in adults between 18-40 years (57.14%)[5]. In Zone-B maximum rate of *klebsiella pneumoniae* incidence was recorded in > 40 years (64.51%) age group followed by 5-18 years (44.44%) and minimum incidence was observed in 18-40 (41.66%) years of age. In Zone-C, maximum rate of *klebsiella pneumoniae* incidence was recorded in > 40 years (61.29%) age group followed by 59.37 in age group 5-18 years and minimum incidence was recorded in adults between 18-40 years (34.28%). In Zone-D maximum rate of *klebsiella pneumoniae* incidence was recorded in > 40 years (84.61%) age group followed by 70.00% in age group 5-18 years and minimum incidence was observed between 18-40 years (50.00%). In Zone-E maximum rate of *klebsiella pneumoniae* incidence was recorded in > 40 years (68.18%) age group followed by 60.00% in 18-40 years age group and minimum incidence was observed in age group between 5-18 years (57.14%). The average incidence of the *S. aureus* infections in three age groups was found to be highest in age group >40 years (66.43%) followed by 56.12% in 5-18 of age group and least incidence was observed in age group 18-40 42.42%.

4. DISCUSSION

In present study, 350 clinical samples were isolated from different places of Bagalkot district, for convenience, five Zones are made; namely A, B, C, D and E. Out of 350 clinical samples, 230 from males and 120 from females were collected. After performing all biochemical tests using standard kit, and specific test the isolates were confirmed as *klebsiella pneumoniae*. The prevalence rate of *klebsiella pneumoniae* in Bagalkot District was observed around 58.06%. Out of 180 positive isolates, the incidence rate was more in sputum sample 76.00%, followed by 18 %, in blood, 6% in urine samples. The survey report also shows the percentage of incidence was more in the age group of above 40 (66.43%) years and age group between 8 to 18 (56.12%) years The prevalence of *klebsiella pneumoniae* in hospital varies considerably from one region to another [7]. Geographic spread of *klebsiella pneumoniae* between countries and continent has been reported previously and proven by molecular evidences. The highest colonization of *klebsiella pneumoniae* was observed in Zone-D with 72% followed by Zone-E with 66.66% and the lowest incidence was observed in Zone-B with 52.85%. Out of 180 positive isolates, the incidence rate was more in sputum samples (76.00%) [8]. The incidence of *klebsiella pneumoniae* isolates were categorized based on age groups. Age group wise incidence of *klebsiella pneumoniae* colonization studies, says that age group above 40 and between 6 to 18 years, the individuals are more prone for *klebsiella pneumoniae* infections [10]. The highest rate of incidence was recorded in above 40 years, in Zone-D with (84.61%), followed by Zone-A with 72.00%, in Zone-E with 68.18%, in Zone-B 64.51% and in Zone-A 50.0% and in Zone-C 61.29%. The age between 6 to 20 years, the highest incidence was recorded in Zone-D (70.00%) followed by in Zone-A 60.00%, Zone-C 59.37%, Zone-E 57.14% and in Zone-B 44.44%. The age between 18-40 years in all five Zones least incidence was observed. The average incidences of *klebsiella pneumoniae* in three age groups. In our investigation the highest incidence was observed

in the age group of above 40 years (66.43%) and age group between 5-18 years, whereas least incidence was observed in the middle age group.

5. CONCLUSION

350 samples were collected from 5 different Zones of Bagalkot district, the present study a total of 180 *klebsiella pneumoniae* isolates isolated from 350 clinical samples, out of which 230 from males and 120 from females. The isolates are confirmed by all biochemical tests. The incidence of *klebsiella pneumoniae* in 5 Zones and the highest percentage of incidence were observed in Zone-D with 72% and lowest incidence was observed in Zone-B with 52.85%. Out of 180 positive isolates, the incidence rate was more in sputum sample 76.00%, followed by 18 %, in blood, 6% in urine samples. The survey report also shows the percentage of incidence was more in the age group of above 40 (66.43%) years and age group between 8 to 18 (56.12%) years. The results of age wise distribution of *klebsiella pneumoniae* in all five Zones were studied and the percentage of incidence was more in the age group of above 40 (66.43%) years and age group between 8 to 18 (56.12%) years.

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Isolation And Identification Of *Pseudomonas* Species From Fruits And Vegetables

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Abstract

In recent times several food borne pathogens have become important and a threat to public health. The application of molecular techniques for detecting and typing of food borne pathogens in surveillance studies provide reliable epidemiological data for tracing the source of human infections. A wide range of molecular techniques available for detecting, speciation, typing, classifying and characterizing food borne pathogens of great significance to humans Among molecular techniques them polymerase chain reaction plays important role. The current wok is carried out with the isolation of food borne pathogens by spoiled vegetables; spoiled fruits fallowed by series of biochemical test were carried out and antibiotic pattern was studied, based on resistance and sensitivity DNA isolation was done and finally the pseudomonas species were confirmed by amplifying specific primers.

1. INTRODUCTION

Fruits and vegetables play a vital role in human nutrition by supplying the necessary growth factors such as vitamins and essential minerals in human daily diet and that can help to keep a good health. Fruits and vegetables are widely distributed in nature. One of the limiting criteria is the relatively short shelf-life period caused by pathogens attacked [1]. It is estimated that about 20-handling, packaging, storage and transportation may result in decay and production of microorganisms, which become activated because of the changing physiological state of the fruits and vegetables [2 and 3]. Thus extra care should

be taken during personnel handling of these fruits and vegetables; such as harvesting, cleaning, sorting, packaging, transport and storage. Pathogenic organisms can enter fruits and vegetables through damaged surfaces, such as punctures, wounds, cuts and splits that occur during growing or harvesting. One of the factors influencing virulence of pathogens is their ability to produce enzymes capable of degrading their host tissue [4]. Microorganisms especially bacteria and fungi have been identified as major organisms causing deterioration of various fruits by the secretion of extracellular cell wall degrading enzymes. Food borne pathogens are the leading causes of illness and death in undeveloped countries, killing approximately 1.8 million people annually. In developed countries, food borne pathogens are responsible for millions of cases of infectious gastrointestinal diseases each year, costing billions of dollars in medical care and lost productivity. New food borne pathogens and food borne diseases are likely to emerge, driven by factors such as pathogen evolution, changes in agricultural and food manufacturing practices, and changes to the human host status [5].

2. MATERIAL AND METHODS

2.1 Sample collection

Spoiled fruits and vegetables are randomly collected from local area of Vidyagiri, Bagalkot. A total of 12 spoiled fruits and vegetables were taken for the study [7 & 8]. The samples are washed with tap water to remove the surface dust and later rinsed with distilled water as surface sterilization. The sample names were coded for simplicity on the basis of their types. The codes with their name are listed in table 2.1.

Table 2.1: Sample named with code (S1 to S12)

Sl. No.	Sample type	Scientific name	Sample code
1	Tomato type1	<i>Solanum lycopersicum</i>	S1
2	Tomato type2	<i>Solanum lycopersicum</i>	S2
3	Capsicum type1	<i>Capsicum annuum</i>	S3
4	Capsicum type2	<i>Capsicum annuum</i>	S4
5	Chicku	<i>Manilkara zapota</i>	S5
6	Bitter guard	<i>Momordica charantina</i>	S6
7	Banana	<i>Musa paradisiaca</i>	S7
8	Apple	<i>Malus domestica</i>	S8
9	Green chilli	<i>Capsicum frutescens</i>	S9
10	Orange	<i>Citrus aurantium</i>	S10
11	Fig	<i>Ficus carica</i>	S11
12	Strawberry	<i>Fragaria ananassa</i>	S12

2.2 Isolation of bacteria

The importance of this step is to isolate pure colonies of bacteria. The streak plate is a qualitative isolation method; quadrant streaking is mostly done to obtain pure colonies. The inoculation of the culture is made on the agar surface by back and forth streaking with the inoculation loop over the solid agar surface. This will make a dilution gradient across the agar plate. Upon incubation, individual colonies will arise from the biomass.

2.2.1 Bacteriological Analysis

Pseudomonas species grows well on all normal laboratory media but specific isolation of the organism, from environmental sites or from human, animal or plant sources, is best carried out on a medium, which contains a selective agent and also constituents to enhance pigment production. Cetrimide inhibits the growth of many microorganisms whilst allowing *Pseudomonas species* to develop typical colonies. Cetrimide is a quaternary ammonium salt, which acts as a cationic detergent that reduces surface tension in the point of contact and has precipitant, complexing and denaturing effects on bacterial membrane proteins. It exhibits inhibitory actions on a wide variety of microorganisms including *Pseudomonas species* other than *Pseudomonas species*. Bacteriological analysis was done on Citrimide agar (cetyltrimethylammonium bromide) specific media for *Pseudomonas species*.

2.3. Biochemical studies

KB002 is used for identification of gram-negative rods. HiAssorted Biochemical Test kit can be used for screening pathogenic organisms from urine, entric specimens and other relevant clinical samples. It can also be used for validating known laboratory strains. It is a standardized colorimetric identification on system utilizing seven conventional biochemical tests and five carbohydrate utilization tests. The tests are based on the principle of pH change and substrate utilization. On incubation organisms undergo metabolic changes which are indicated by a color change in the media that can be either interpreted visually or after addition of reagents.

2.4. Antibiotic resistance studies

Characterized strains were tested for their susceptibility to twelve antimicrobials, using disc diffusion method using discs supplied by Himedia Laboratory Pvt. Ltd. Organisms were grown in Nutrient broth later 0.1ml culture was then spread over Nutrient agar plates. Antimicrobial disks impregnated with either of the following antimicrobials; the Table 2.4 shows the list of antibiotic discs. The discs were placed on the surface of inoculated agar plates. Zones of inhibition around each antimicrobial disc were measured after an incubation period of 24hrs at 37°C.

Table 2.4: List of antibiotics used for antibiotic study

Sl. No.	Product code	Antimicrobial agent	Symbol	Disc content(mcg)
1	SD040	Cefotaxime	CTX	30
2	SD023	Nitrofurantoin	NIT	300
3	SD010	Co-Trimoxazole	COT	25
4	SD727	Meropenum	MRP	10
5	SD073	Imipenem	IPM	10
6	SD035	Amikacin	AK	30
7	SD063	Amoxyclav	AMC	30
8	SD016	Gentomicin	GEN	10
9	SD037	Tetracyclin	TE	30
10	SD280	Ertapenem	ETP	10
11	SD065	Ceftriaxone	CTR	10
12	SD047	Cefazolin	CZ	30

2.5. DNA isolation and quantification

The isolation of DNA from bacteria is a relatively simple process. The organism to be used should be grown in a favorable medium at an optimal temperature, and should be harvested in late log to early stationary phase for maximum yield [10]. The genomic DNA isolation needs to separate total DNA from RNA, protein, lipid, etc. Initially the cell membranes must be disrupted in order to release the DNA in the extraction buffer. SDS (sodium dodecyl sulphate) is used to disrupt the cell membrane. Once cell is disrupted, the endogenous nucleases tend to cause extensive hydrolysis. Nucleases apparently present on human fingertips are notorious for causing spurious degradation of nucleic acids during purification. DNA can be protected from endogenous nucleases by chelating Mg^{2++} ions using EDTA. Mg^{2++} ion is considered as a necessary cofactor for action of most of the nucleases. Nucleoprotein interactions are disrupted with SDS, phenol or proteinase K. Proteinase enzyme is used to degrade the proteins in the disrupted cell soup. Phenol and chloroform are used to denature and separate proteins from DNA. Chloroform is also a protein denaturant, which stabilizes the rather unstable boundary between an aqueous phase and pure phenol layer. The denatured proteins form a layer at the interface between the aqueous and the organic phases which are removed by centrifugation. DNA released from disrupted cells is precipitated by cold absolute ethanol or isopropanol. For quantification of DNA the reading at 260 nm allows calculation of the concentration of nucleic acid in the sample. Pure preparations of DNA and RNA have OD260/OD280 values of 1.8 to 2.0, respectively.

3. PCR AMPLIFICATION

Using PCR, the target DNA sequence can be selectively amplified, thus increasing the amount of target available for detection. The PCR technique is based on the reiteration of three-step process: denaturation of dsDNA into single strands, annealing extension primers homologous to the target DNA sequence to be amplified to the single stranded DNA, and enzymatic extension of primers using a thermo stable enzyme such as Taq DNA polymerase. A typical amplification is 20-40 cycles and results in million fold amplification of the original target DNA. After amplification, the samples are run on agarose gel electrophoresis for 1hour and the gel is observed under gel documentation unit.

4. RESULTS

4.1. Isolation of *Pseudomonas species*

Specific media for culture technique was followed and a total of 12 spoiled fruits and vegetables were collected grown on Cetrimide agar and maintained on nutrient agar slants in duplicates [Table 4.1]. All the isolates were named according to the sample number from which they were obtained. Cetrimide is a quaternary ammonium salt, which acts as a cationic detergent that reduces surface tension in the point of contact and has precipitant, complexing and denaturing effect on bacterial membrane proteins. Cetrimide inhibits the

growth of many microorganisms whilst allowing *Pseudomonas species* to develop typical colonies.

Table 4.1: Growth of bacterial isolates on Citrimide agar

Sl. No.	Sample name	Sample code	CA
1	Tomato type1	S1	+
2	Tomato type2	S2	+
3	Capsicum type1	S3	+
4	Capsicum type2	S4	+
5	Apple	S5	+
6	Bitter guard	S6	+
7	Banana	S7	+
8	Green chilli	S8	+
9	Chicku	S9	-
10	Orange	S10	-
11	Fig	S11	-
12	Strawberry	S12	-

4.2 Biochemical kit

After incubation change in color indicates the presence interprets the utilization of those substrates showing [Table 4.2] the presence of *Pseudomonas species* [14].

Table 4.2: Different biochemical tests compacted in single kit

Sl no	Sample code	Cit	Lys	Orn	Ure	Phe	Nit	H2S	Glu	Ado	Lac	Ara	Sor
1	S1	+	-	-	+	-	+	-	+	+	+	+	+
2	S2	+	-	-	+	-	+	-	-	-	-	-	-
3	S3	+	-	-	+	-	+	-	+	+	+	+	+
4	S4	+	-	-	+	-	+	-	-	-	-	-	-
5	S5	+	-	-	+	-	+	-	+	-	-	-	-
6	S6	+	-	-	+	-	+	-	-	-	-	+	-
7	S7	+	-	-	+	-	+	-	+	+	-	-	-
8	S8	+	-	-	+	-	+	-	+	-	-	+	-

4.3 Isolation and quantification of DNA:

The DNA was isolated from *Pseudomonas species* and the purity and integrity of the isolated DNA was examined by agarose gel electrophoresis [11]. The bands obtained by the different samples are shown in the below gel Figure: 4.3.1. For quantifying DNA and RNA, readings should be taken at wavelengths of 260 nm and 280 nm. The reading at 260 nm allows calculation of the concentration of nucleic acid in the sample [12 &13].

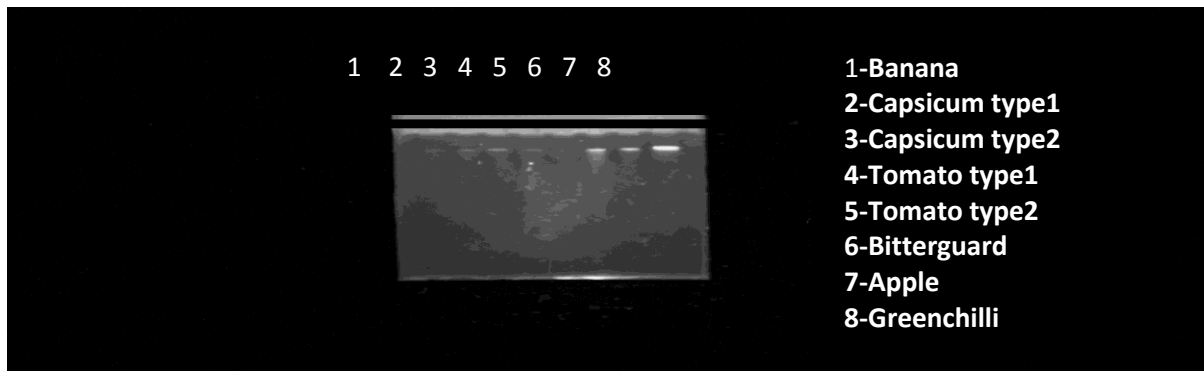


Figure 4.3.1: Isolation of DNA from all the 8 samples

Table 3.9: Spectrometric analysis results of DNA samples

Sl. No.	Sample code	ng/pl	260/280nm
1	S1	80.6	1.44
2	S2	98.3	1.62
3	S3	229.2	1.78
4	S4	319.0	1.73
5	S5	126.7	1.43
6	S6		
7	S7	357.5	1.72
8	S8	540.0	1.59

4.4. Polymerase Chain Reaction (PCR)

The target DNA sequence can be selectively amplified, thus increasing the amount of target available for detection. The PCR technique is based on the reiteration of three-step process: denaturation of dsDNA into single strands, annealing extension primers homologous to the target DNA sequence to be amplified to the single stranded DNA, and enzymatic extension of primers using a thermo stable enzyme such as Taq DNA polymerase. A typical amplification is 20-40 cycles and results in million fold amplification of the original target DNA. After amplification, the samples are run on agarose gel electrophoresis for 1hour and the gel is observed under gel documentation unit. Using specific primers PCR was carried out on DNA isolated from *Pseudomonas species*. The conditions of the PCR were carefully standardized and all the parameters were established. The optimum annealing temperature was found to be 55°C and within 30 cycles a substantial band was amplified [14].

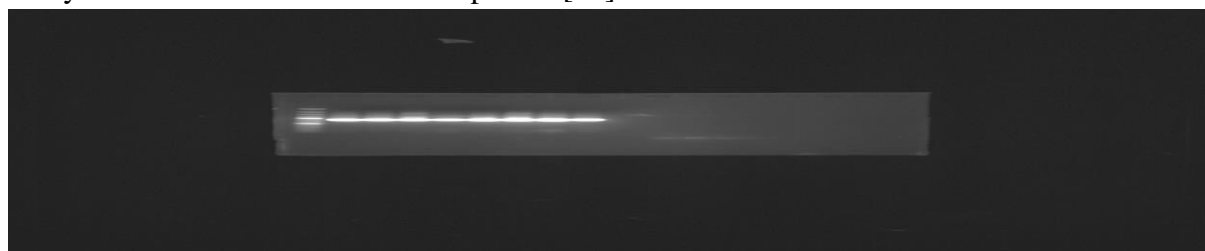


Fig 2: PCR Amplification of food borne *Pseudomonas* DNA isolated from different samples. From left to right: 1-Molecular marker 2-Banana, 3-Tomato type1, 4-Apple, 5-Tomato type2, 6-Green chilli, 7-Bitterguard, 8-Capsicum type2 and 9-Capsicum type1

5. DISCUSSION AND CONCLUSION

The majority of spoiled fruits and vegetable were found to be contaminated through pseudomonas species infections the other study was carried out will support our research. The current study is focused isolation of pseudomonas species will enables the insight in to the food borne pathogens and most of the food borne pathogens is contaminants from spoiled vegetables and food. The biochemical analysis was shows that most of the food spoilage is by the contamination of the *pseudomonas species* [15]. The high percentage resistance was observed in bacterial isolates like Tomato type1, Tomato type2, Capsicum type1, Bitter guard. Several detection and typing methods have been developed and are widely used to detect, differentiate, type and to classify pathogens for efficient identification, outbreak investigations, clinical treatments and epidemiological studies [16]. The combination of two or more primers or methods, and optimization of methods will drastically increase the discriminatory power of the detection or typing technique employed. The detection and typing methods reviewed here increases our knowledge on which detection or typing method to go for and the reason for the choice.

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Identification Of Drug Targets In *Pseudomonas Fluorescens* Through Subtractive Genomics Approach For Effective Treatment

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Abstract

Pseudomonas fluorescens is a common gram negative rod shaped bacterium .It belongs to the pseudomonas genus 16s rRNA analysis has placed *Pseudomonas fluorescens* in the *Pseudomonas fluorescens* group within the genus to which it ends its name. It has an extremely versatile metabolism, and can be found in the soil and in water. *Pseudomonas fluorescens* is an unusual cause of disease in humans, and usually affects patients with compromised immune systems. In this study a modern approach called subtractive genomics is used to find novel drug targets. The approach works by subtracting the genes or proteins homologous to both host and the pathogen and identify those set of genes or proteins which are essential for the pathogen and are exclusively present in the pathogen. The complete proteome of *Pseudomonas fluorescens* was retrieved from NCBI genome database with accession number NC_016830.1. The complete proteome of the pathogen consists of 5899 proteins. The protein sequences greater than or equal to 100 amino acids were selected. Among 5899 protein sequences, there were 5462 protein sequences less than 100 amino acids protein sequences were then subjected to CD HIT Sub cellular Localization Prediction of non-homologous essential proteins revealed 12 outer membrane proteins play an important role in drug interaction. Metabolic pathway analysis of outer membrane proteins was done using KEGG database and functions of 6 drug target proteins are identified.

1. INTRODUCTION

Pseudomonas infections is an important cause of morbidity and mortality in immune compromised patients, with *Pseudomonas aeruginosa* being the most common species isolated from clinical specimens. *Pseudomonas fluorescens* is a member of the fluorescent pseudomonad group and (unlike *P. aeruginosa*) has generally been regarded to be of low virulence and an infrequent cause of human infection [1]. However, it has been reported to cause infections such as blood transfusion-related septicemia, catheter-related bacteremia, and peritonitis in peritoneal dialysis patients [2]. Large genomic sequencing projects of pathogens as well as human genome leads to immense genomic and proteomic data which would be very beneficial for the novel target identification in pathogens. Subtractive genomic approach is one of the most useful strategies helpful in identification of potential targets. The approach works by subtracting the genes or proteins homologous to both host and the pathogen and identify those set of gene or proteins which are essential for the pathogen and are exclusively present in the pathogen. Subtractive genomic approach is employed to identify novel target in *Pseudomonas fluorescens*. Subtractive genomics approach eliminates the sequences that are homologous to host, finds those proteins that are essential for the pathogen but absent in the host. The protein sequences that are exclusively present in the pathogen are to be used as drug targets [3]. The availability of different tools and databases has made to be an easy task to identify novel drug targets. The various tools and databases available are NCBI, CDHIT, BLAST, DEG BLAST, CELLO, KAAS.

2. MATERIALS AND METHODS

In subtractive genomics approach the main objective is to find the essential proteins that are exclusively present in the pathogen but absent in the host with the intention to avoid any cross reactions and side effects [4]. The first step involves the retrieval of complete proteome from NCBI.

2.1 Retrieval of complete proteome

The complete proteome of *Pseudomonas fluorescens* was retrieved from NCBI (National Center for Biotechnology Information) genome database. NCBI advances science and health by providing access to biomedical and genomic information. It also contains information about chemicals and bioassays, data and software, DNA and RNA, domains and structure, genes and expression, genetics and medicine etc.

2.2. Selection of proteins equal or more than 100 amino acids

Protein sequences greater than or equal to 100 amino acids were considered for further analysis sequences less than 100 amino acids were filtered as they don't provide enough information.

2.3 Filtering of redundant sequences using CD HIT web server

CDHIT (cluster database at high identity with tolerance) was originally developed by Dr .Weizhong Li at Dr.Adam Godik's lab at the Burnham's institute .A large number of protein sequences usually contains redundant sequences. This is done using a web server

called CD HIT .It is cluster database at high identity with tolerance. It clusters and compares biological sequences at a certain identity. The program takes fasta (<) format sequence database as input and can handle very large databases .CDHIT uses longest sequence as a representative of the cluster to remove sequences above a certain threshold. It helps to reduce the computational time and manual efforts in many sequences analysis tasks.

2.4. BlastP against human proteome to find non homologous sequences

The BlastP program was used to find non homologous sequences. The Basic Local Alignment Search Tool (BLAST) finds regions of local similarity between sequences. The program compares nucleotide or protein sequence against sequence database and calculates the statistical significance of matches .BLAST can be used to infer functional and evolutionary relationship between sequences as well as help identify members of gene families .The E value of e^{-4} was used as cut off to identify non homologous sequences . Sequences with e^{-4} and above were homologous and were not considered for further analysis; sequences with positive E values were non homologous and were considered for further analysis. BLAST is a database search tool developed by NCBI it detects the relationship among sequences which is shared only at an isolated region of similarity. Parameters with Expect value below considered. E value provides information about the likelihood that a given sequence matches is purely by chance.

2.5. Search for Essential proteins using DEG BlastP

DEG BlastP was performed against human proteome to find essential proteins that are indispensable for the survival of an organism and are considered as foundation of life. It is database of essential genes. DEG hosts records of currently available essential genomic elements, such as protein coding genes and non-coding RNA, among bacteria, Achaea and eukaryotes .Essential genes in a bacterium constitute a minimal genome, forming a set of functional modules, which play key roles in various field and synthetic biology. For protein sequence to be essential there are certain parameters that are considered. The parameters are: sequence identity, E value, bit score.

2.6. Sub cellular localization prediction of Essential proteins

There are several strategies commonly used to develop a vaccine. To elicit an immunological response, attenuated, or genetically modified strains of the pathogen are being used as the vaccine. Alternately, the use of outer membrane proteins was proposed .These proteins are part of the cell envelop of gram negative bacteria and participate in maintaining cell integrity, pathogen adaptation to the host cells. They make good target for the development of a cell free vaccine. Sub cellular localization involves the computational prediction of where a protein resides in the cell. Prediction of protein sub cellular localization is an important component as it predicts the protein function and genome annotation, and it can aid the identification of targets. Sub cellular localization of essential protein sequences can be done by any of the prediction tool. For our study CELLO tool was used to predict the location.

CELLO : an approach based on the two level SVM system .The first level comprises a number of SVM classifiers each based on a specific type of feature vectors derived from sequences .The second level SVM classifiers function as the jury machine to generate the probability distribution of decisions for possible localization [5].

2.7. Metabolic pathway analysis of essential proteins using KEGG

The pathway analysis of essential non homologous proteins is important to know the function of the proteins. For the pathway analysis KEGG pathway was used to identify whether it is present in the host. KEGG pathway is a collection of manually drawn pathway maps representing our knowledge on the molecular interaction for various metabolisms. KEGG stands for Kyoto Encyclopedia for Genes and Genomes, and has become a major resource for pathway analysis and contains a wealth of data associated with pathways, genes, genomes, chemical compounds and reaction information, in addition to links to outside resources such as PubMed [7]. This will focus on the pathway data resource in KEGG.

2.8. Drug Bank Analysis

The drug bank database is a unique bioinformatics and cheminformatics resource that combines both drug data with comprehensive drug targets information. The targets identified have not been used as drug targets and hence the identified protein sequences can be used as putative drug targets. Targets identified are not present in the drug bank and hence identified proteins can act as drug targets.

3. RESULTS

3.1. Retrieval of complete proteome of *Pseudomonas fluorescens*. from NCBI genome database

The complete proteome of *Pseudomonas fluorescens* was retrieved from NCBI genome database with accession number NC_016830.1. The complete proteome of the pathogen consists of 5899 proteins [8].

3.2. Selection of proteins having more than 100 amino acids

The protein sequences greater than or equal to 100 amino acids were selected for further analysis ,sequences having less than 100 amino acids were excluded from the list as they don't provide enough information. Among 5899 protein sequences, there were 5462 protein sequences less than 100 amino acids and remaining 437 sequences were not considered for further analysis.

3.3. Filtering of redundant sequences using CD HIT web server

Protein sequences were then subjected to CD HIT (cd hit.org/) web server to remove redundant sequences. Among 5462 proteins 504 protein sequences were found to be duplicates which were eliminated from the list. the remaining 4454 protein sequences were considered for further analysis

3.4. BlastP against human proteome to identify non-homologous sequences

The sequences were subjected to BlastP against human proteome to identify non-homologous sequences specific to the pathogen .Among 4951 protein sequences 2137

protein sequences were found to be non- homologous sequences and were considered for further analysis .Remaining 2814 protein sequences were found to be homologous to human proteome and hence were not considered for further analysis [9]

3.5. Search for Essential proteins using DEG BlastP

The set of proteins after BlastP were subjected to DEG BlastP against human proteome to identify Essential proteins of *Pseudomonas fluorescens*. Among 2137 proteins 730 proteins were identified as Essential protein sequences and considered for further analysis. Remaining 1407 proteins were found to be homologous to human proteins and hence were not considered for further analysis [10].

3.6. Sub cellular Localization Prediction

Sub cellular Localization Prediction of Essential, non-homologous proteins was performed using CELLO. The Localization of 730 proteins was predicted. The Localization of each protein was carried out using CELLO tool which predicts the location of each protein inside the cell. The one with reliability was considered. Out of 730 non-homologous proteins 580 were inside the cytoplasm, 85 were present in the inner membrane, 49 were in the periplasmic, 4 proteins were found in the extracellular membrane and 12 were on the outer membrane of the cell [Table 1 and Fig 1] [11]. The outer membrane proteins can be easily targeted and hence for our study outer membrane proteins were considered for pathway analysis. This analysis is done to know the function of these proteins [Table1].

Table 3.1: Prediction of proteins localization using CELLO

Sl. NO.	Sub cellular Localization Prediction	Number of proteins
1	Cytoplasmic	580
2	Inner membrane	85
3	Periplasmic	49
5	Outer membrane	12
5	Extracellular	4

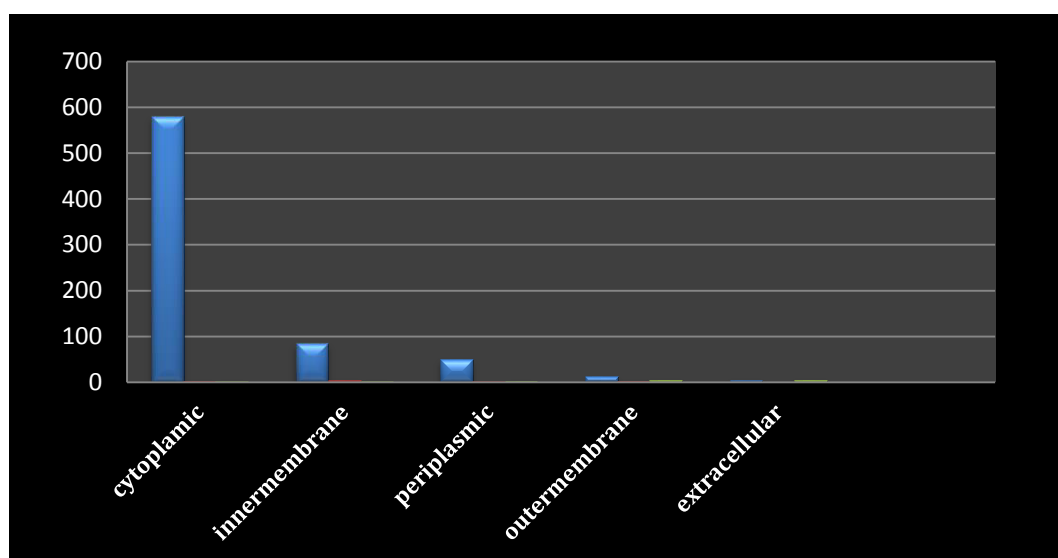


Figure 1: graphical representation of proteins sub cellular localization.

3.7. Metabolic Pathway Analysis

The pathway analysis of each protein was done to identify pathogen specific pathway. The outer membrane is one of the important membranes of gram-negative bacteria. The pathway analysis of outer membrane proteins was carried out to know the function of each protein. Sub cellular localization revealed that 12 proteins were present on outer membrane of the pathogen. Metabolic pathway was analyzed for all the 12 proteins in KEGG where 6 proteins pathway were specified [Table2] and remaining 6 pathways was not specified [12].

Table 2: Metabolic pathways of 6 outer membrane proteins

Protein Name	Length	Pathway	Kegg ID
Multispecies: Aspartate carbamoyltransferase	334	Biosynthesis of amino acids, Cysteine and methionine metabolism	
SepL/TyeA/HrpJ family type III secretion system gatekeeper	375	ABC transporters	1464118197
Multispecies: formaldehyde dehydrogenase, glutathione-independent	399	Bacterial secretion system	1464118434
peptidase M19	456	beta-Lactam resistance	1464118898
2-methylcitrate dehydratase 463		Two-component system, Cationic antimicrobial peptide (CAMP) resistance	1464119095
imidazole glycerol phosphate synthase	770	Nucleotide excision repair	1464119358

3.8. Drug Bank Analysis

From the Drug Bank Analysis, it is found that 6 proteins obtained from above study have not been targeted for treatment against this pathogen. Hence, the identified proteins can be used as potential drug targets.

4. DISCUSSION AND CONCLUSION

The main objective of this study was to identify proteins that are specific to the pathogen so that they can be used as drug targets. Subtractive genomics approach was used to achieve the goal. The sequences homologous to host were identified and were not considered in this study to avoid cross reaction and side effects. Only sequences that are exclusively present in the pathogen and are essential to them are considered. Sub cellular Localization Prediction of non-homologous essential proteins revealed 12 outer membrane proteins. Metabolic pathway analysis of outer membrane proteins was done using KEGG database and function of only 6 proteins were known. These proteins are not used as target yet against *Pseudomonas fluorescens* as known from drug bank database analysis. Hence these proteins can be considered as potential drug targets.

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“And Ain’t I a Woman?” Intersections of Race, Gender and Class in Black Feminist Theory and Black Women’s Literature (Literary Practice)

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Abstract

Sojourner Truth’s powerful statement at the Women’s Convention in Akron, Ohio in 1851 was a deconstruction of the notion of a global, common womanhood. Eminent black feminist critic bell hooks had spoken in the context of the racial realities that had made African-American women’s experience in America a unique one because of the unusual position they occupied in society. Black women were expected to choose between “being black” and “being female”. Literature is a powerful ideological tool that influences as well as responds to socio-cultural and political discourses. Literary representations therefore can debunk stereotypical notions about marginalized groups in grappling with problematic issues of ethnicity and identity and intersections of race, gender and class. Black Feminist theory was instrumental in defying homogenization of the “woman’s dilemma” and monolithic concepts of sisterhood. The rich and diverse experience of black women in America has been given space within the tradition of black women’s writing. Contemporary feminist debates and changing perspectives have emerged as challenges to the literary practice adopted by Black women writers. This paper proposes to examine the relevance of a distinct and unique Black Feminist consciousness as triggering the emergence of a black women’s literary movement. The paper would interrogate the implications of deconstructionist debates in the context of black women’s struggles (in life and literature). The paper shall incorporate historicity as a methodology to examine the intersections of race, gender and class in theory and practice. It would establish that reverberations of Sojourner Truth’s question “And Ain’t I a Woman?” forged the sisterhood between lived experience and literary representations to reinforce the black feminist theoretical standpoint.

1. INTRODUCTION

Black feminist literary studies/theory and Black women's literary practices had always an uneasy and fraught relationship to mainstream feminism and white European literary theory and practices. The problem lay to an extent in the exclusionist elitism of mainstream feminism and the politics and practice of reading and writing literature in the American academia. While the one attempted to homogenize the problems of all women under the rubric of a monolithic "sisterhood", the other evolved a hegemonic discourse that excluded /marginalized issues of race. Toni Morrison's now canonical *Playing in the Dark: Whiteness and Literary Imagination* deconstructs classical white American literary texts to point out how the Africanist presence has been misrepresented or ignored in much of mainstream literature in America. The need to "talk back" and the agenda of destabilizing racial, gender and class hierarchies have been the *tour de force* of much of Black feminism/feminist theory and literary practice. The early American woman's rights movement embraced the notion of a universal "woman" who was "generally white, middle to upper class, and based in the Eastern portions of the United States. It most certainly did not include the female slaves..." (Anne Duccille, *Feminist Literary Theory*, 2006.p.29)

Sara Evans traces the inception/emergence of feminism in the United States to the abolition movement of the 1830s and 1840s and the civil rights movement of the 1960s— both struggles for racial equality—during which they moved from "individual discontents to social movement in their own behalf". The ideology that condemned oppression was "analogous to their own" and they learned to initiate and organize collective action that helped them to claim equality for themselves. (Sara Evans, *Personal Politics*, 1980. pp.24-5). However, one of the primary paradoxes of first-wave feminism in the United States was that the inhuman condition of the black slaves served inspirational and instructive functions for white women. Also, ironically, black women who were often marginalized and at times completely excluded from it "had a keener sense of gender, as well as racial inequality; a more nuanced, sun-up to sun-down, field hand and household experience of the sexual division of labor; a longer and more complex history of what could be called feminist activism".(Duccille, 2006. pp.30-31). The failure of mainstream feminism to acknowledge the history of black feminist agitation and writing has resulted in the rift between the former and Black feminist theory/criticism and determined the subversive nature of Black feminist writing (literary practice).

2. RISE OF BLACK FEMINISM

Black women of America did not have the tradition of submission to male authority or dependence on men as the white women. This was usually traced to their African heritage of matriliney. The slave cabins were not patriarchal realms, families were mostly kinship not nuclear and households were more often than not, female headed. This was due to the fact that black women's roles were defined by responsibility and intensive

labor rather than power. They shared a tradition of self-reliance, sisterhoods, women's networks and female entrepreneurship that survived despite slavery in the New World. In the nineteenth century, while white women were engaged in a fight for suffrage and equal rights to property and ownership, their fundamental objective was to overthrow male domination. Meanwhile black women were concerned with the basic human right to "own" their own bodies, sexualities and labor—not to be owned as chattels. White women saw marriage as a "civil death" and fought to change divorce laws, while black women lobbied to change laws that prohibited marriage. While white women rejected traditional gender roles, black women wanted the right to reclaim traditional gender roles, the luxury to love their own men and mother their own children. (Ducille, 2006, 29-52)

Historically, black women and women of color have been asked to choose, differentiate and prioritize their racial and gender identities, to "get out of their skin" and divide their "self". White women however were not expected to distinguish between being a woman and being white. This problematic of essentialism has haunted western feminism and the fall-out has been a rift of ideology, political standpoint and literary practice. Under slavery, black women were exploited in gender specific ways as the institution of slavery thrived on the commodification of black women's labor, sexuality and reproductive abilities. Rape, concubinage and forced impregnation sustained the exploitative system. Black women therefore were subjugated in terms of gender and race and black women writers, activists and intellectuals had shared concerns on issues of race and gender. Anne Ducille writes that this "double consciousness" and the notion of "woman" as a "complex and inclusive category" was common to both elite black thinkers and writers as well as the masses of impoverished and underprivileged black women (Ducille, 2006.pp.36). In other words, black feminist theory was enriched by the intersections of race, class and gender, which lent itself to a symbiotic relationship with black women's creative writing to forge a sustained "sisterhood". Sojourner Truth's impromptu address with its famous refrain "And ain't I a Woman?" at the Akron Women's Rights Convention in 1851 may have been appropriated as a feminist battle cry by white women, but the true import of Truth's "scathing indictment of the racist ideology that positioned black females outside the category of woman and human while at the same time exploiting their "femaleness." Her words "also commented, ironically and pointedly, on the failed sisterhood that sought to silence her within and exclude her from the very movement that women like her inspired, enabled and initiated." (Ducille, 2006.p.37) Truth's words and sentiments were a part of the discourse shared among black women as they remained determined to assert their own womanhood, subjectivity, identity and humanity. Black women like Sojourner Truth, Harriet Jacobs and Harriet Wilson "insisted upon telling their own stories. In so doing , they not only expanded the concept of womanhood; they also took back the particularity of slavery, embodying with their own lived experience what white feminists had reduced to a metaphor." (Ducille, 2006.p.38)

3. BLACK WOMEN'S LITERARY MOVEMENT: CONSTRUCTING A COUNTER CANON

Black women activists, artists, writers and intellectuals of the twentieth century found themselves doubly marginalized. Within the male centered African-American writing tradition, they were pushed to the periphery on allegations of feminist preoccupation while they were excluded from mainstream feminist literary canons for their alleged preoccupation with race. So in art as in life, black women writers had then the only option of carving their own path in theory and practice. In *Reading Black Reading Feminist*, Henry Louis Gates Jr. quotes Anna Julia Cooper who had argued "convincingly and eloquently" for the recognition of the black women's literary tradition:

"One muffled strain in the silent South, a jarring chord and a vague uncomprehend cadenza has been and still is the Negro. And of that muffled chord, the one mute and voiceless note has been the sadly expectant Black woman... The "other side" has not been represented by one who "lives there" And not many can more sensibly realize and more accurately tell the weight and fret of the "long dull pain" than the open-eyed but hitherto voiceless Black Woman of America... [just] as our Caucasian barristers are not to blame if they cannot quite put themselves in the dark man's place, neither should the dark man be wholly expected fully and adequately to reproduce the exact voice of the Black Woman."

(Anne Julia Cooper in Henry Louis Gates Jr. Ed. *Reading Black Reading Feminist: a Critical Anthology*, 1990,p.1)

Gates writes that the challenge thrown by Julia Cooper to the authority of the black male voice that presumed and claimed to speak of the "Negro experience" in its totality while ignoring the complex and problem- ridden questions of an exclusive black women's experience has, after 75years, expressed/manifested itself in the emergence of an African American women's literary tradition of their own. Unlike most of the black male authors of the older generation who disowned any African-American influence on their writing, claiming to speak of a monolithic human experience or own only a "white paternity", black women writers drew their strength from other black women literary ancestors like Zora Neale Hurston and Anne Petry.

The writers of the African-American women's literary movement write from within a tradition, inspired by a strong sense of bonding with other black women writers-- sharing a literary "sisterhood" as created and encouraged by writers/publishers like Toni Morrison and owning a maternal ancestry. These women are drawn together by the strong bonds of a shared and collective experience and with the intention of breaking the "conspiracy of silence "that had oppressed the selfhood of black women. In their literary representation of the African-American women characters, these writers have rejected the stereotypical images of black women not only by the white American writers but also the black male writers who have projected black women sentimentally as a reaction to the negative white racist stereotypes as the Black Goddess, Black Queen, Super Woman, Mother Goddess etc. In defying the misrepresentations in the body of American literature of African-American women, they have exploded the myths, false notions and expected paradigms about black women's situation/experience/identity in America.

As Gates says, reading the text of the African American women writers allows one to "overhear a black woman testifying about (what)the twin scourges of sexism and racism, merged into one oppressive entity, actually do to a human being, how the combination confines the imagination, perplexes the will and delimits free choice. What unites these texts, what makes them cohere into that imaginary meta text we call a tradition, is their shared structures and common themes."

(Henry Louis Gates Jr. Ed. *Reading Black Reading Feminist: a Critical Anthology*, 1990.p.4)

He quotes Mary Helen Washington who places the black women writers within the tradition they created for themselves:

"Their literature is about black women; it takes the trouble to record the thoughts, words, feelings, and deeds of black women, experiences that make the realities of being black in America look very different from what men have written...Women talk to other women in this tradition."

(Henry Louis Gates Jr. Ed. *Reading Black Reading Feminist: a Critical Anthology*, 1990.p.7)

History—traditionally the domain of men had erased women-- especially black women from its pages but undaunted, the black woman emerged, determined to speak "her story." Black women writers therefore as most black women in real life, pitted against insurmountable odds, fall back on the nurturing support of a sisterhood and shared understanding and empathy. The black women characters they represent in their novels also rely on such a nurturing system though each woman, in her own way is in search of an identity and selfhood – a quest amid their daily toil. The collective experience and the group efforts of black women writers to express their perceptions about their own situations in a racist, classist, sexist patriarchal white American society that has operated in terms of the worst possible exploitation for them have been instrumental in the shaping of a black feminist literary theory and criticism that has emerged as a new genre in the history of "traditional" literary criticisms.

Feminist critics and like Anne Julia Cooper, Mary Helen Washington, Mari Evans, Gloria Wayne Gayles, bell hooks, Barbara Christian, Barbara Smith, Patricia Hill Collins, Gloria T. Hull, Valerie Smith, Jacqueline de Weever, Hortense Spillers, Gayl Jones, Claudia Tate, Melissa Walker, Michael Awkward, Houston A. Baker, Henry Louis Gates Jr., Elliot Butler Evans and many others have placed writings by black women writers in the perspective of "black feminism" that in its essence, is a search for "identification" and "expression" of a long neglected segment of American society constituted by a thrice marginalized group, namely African American women.

Veering away from Euro- American critical practices like structuralism that has believed in the separation of the literary text from its author (to achieve objective distancing), black feminist criticism and black women's literary practice as a body have resisted this separation. Linden Peach writes that black literary criticism has been wary about accepting Euro-American critical trends, "...partly because reclaiming an identity and (narrative) voice to counter centuries of denial and misrepresentation is central to much post-colonial writings, However a major reason for this reluctance to divorce text completely from its social and political context is that literature would lose its social functions. For African and African-

American writers the novel has been an important vehicle to represent the social context, to expose inequality, racism and social injustice." (Linden Peach, Toni Morrison, 1995.p.5)

The debate of artistic/aesthetic objectivity versus subjective authenticity may continue in the critical context, but for the black feminist writer and critic, the richness, diversity and complexity of their experience as black women in America is the inexhaustible well from which they draw their inspiration and in the expression of which their imagination plays freely in uninhibited joy. So for Alice Walker, black women are the most fascinating and beautiful creatures in the world, which have retained their beauty despite all that they have gone through. This mystery of an inner reservoir of spiritual beauty that they seem to possess has lured Walker and other black women writers again and again into their lives and compelled them to portray their lives and labors in their fiction. Black feminism

therefore has emerged as a parallel movement as distinct from white feminism. Critics like bell hooks and Barbara Christian assert that black feminism, though not separatist in intentions, has wished to underscore the difference between the situations of black and white women in America and the world. No monolithic concept could therefore accommodate the heterogeneity and variety of the black woman's situation. According to Barbara Smith,

"thematically, stylistically, aesthetically, and conceptually, Black women writers manifest common approaches to the act of creating literature as a direct result of the specific political, social, and economic experience they have been obliged to share."

(Barbara Smith, *Conditions:Two*. 1977.p.32)

Alice Walker, a self-proclaimed feminist vouchsafed this stand point when she coined the new word/term 'womanist' to describe black feminism. She defined "womanist" as the "feminist of color --- a woman who loves other women sexually or non-sexually... and ... is committed to survival and wholeness of entire people male and female (Alice Walker, quoted in Sunday Times, 17th June, 2001). Poetically, Walker relates womanism to feminism as purple to lavender thus conveying the spirituality (purple being a color that stands for spirituality), vibrancy and strength of the black women's unique experience. Being abused and abused physically, emotionally and psychically every day, they have yet been able to rise from the morass of daily duress like Phoenixes.

Lorraine Bethel in *Some of Us Are Brave* writes that at the core of Black feminism lies "Black women-identification" and that

"Black feminist literary criticism ... is most simply the idea of Black women seeking their own identity and defining themselves through bonding on various levels --- psychic, intellectual as well as physical--with other Black women... Black women-identification is black women not accepting male --- including Black male --- definitions of femaleness or Black womanhood..."

(Lorraine Bethel, *Some of Us Are Brave* 1982, p.184)

Toni Morrison as an editor in Random House has played a key role in providing a "generous stewardship" to a number of black women writers including Toni Cade Bambara, Gayl Jones and Angela Davis. She has inspired by her own example a younger generation of writers, especially Gloria Naylor and created a

"literary sisterhood" that promised every new talent a chance to tell her own story in her own words (voice) and encouraged good writing by publishing them (Gates, 1990, p.4)

The consistent and ceaseless struggles of the African-American woman to survive in a country where she has been the victim of three fold discrimination (viz. race, class and gender) and yet managed to keep her "self" afloat can be termed as nothing short of heroic. Countless such women have suffered and died in this battle for survival, which the mundane business of living had come to stand for them. Their problem-ridden existence was not only a physical burden but a psychological and moral one too accounting for the raw pain that one encounters in the first hand accounts of the lives of these women. Needless to say that literary renderings inspired by so much trauma and torture, of such determined effort and hard-won triumph would be moving in its intensity. The traumatic lived experience of some famous black women that have been narrated in literature bear evidence of a past full of turmoil and toil. Literary images of black women by African-American black women writers repeatedly represent them in the light of their ceaseless work and images of African-American women in their work roles are the most predominant images in their fiction. The reason for this lies not only in the personal experience of almost every African-American woman writer who has taken up the pen but also the result of a collective common experience and a persuasive concern they have shared with the women of their race. Try as they might, African-American women cannot relate their peculiar predicament as women of labor to the experience of the white woman or the African-American man. Sharing the same gender with the former, their cultural realities were and to an extent still are, different from theirs and sharing the same race with the latter has placed them more at a disadvantage because of the simple fact that they have no one else to shift their burden of pain, responsibility or work as do their men folk on them in sheer frustration and masculine aggression, irresponsibility or liberty. And work they must if they must keep their children from starvation and death and the family afloat.

As Angela Davis asserts, slavery constructed an alternative definition of womanhood for the black women that included a tradition of "hard work, perseverance and self-reliance, a legacy of tenacity, resistance and an insistence on sexual equality" (Angela Davis, *Women, Race and Class*, 1981. p.29) Black womanhood therefore, in essence became an antithesis of white womanhood therefore, in that they achieved it through a combination of "grit, shit and mother wit" (Angela Davis, *The Black Scholar*:3, 1971.p.7), all of which entailed a tremendous capacity to endure pressure, hardships and toil.

Sojourner Truth (born Isabella) was an emancipated slave who had adopted the name after forty years of struggle to become free and then to carry on the mission that she felt God intended for her). She was a crusader against oppression and by the onset of the civil war had come to represent a brand of female, communitarian, vernacular African-American leadership that rivaled the masculine, individualist, literary model of the black male

spokesman. Truth's most famous oration titled "And aren't I a woman" had these words as a rhetorical question in her speech—words that were the crux of her challenge as a black woman to racial and sexual stereotypes that few had had the foresight to address so courageously. When white ministers spoke about women as dependents who needed to be carried over ditches and helped into carriages. Sojourner Truth's powerful voice reverberated with the thunder of hitherto unasked questions:

"Nobody ever helped me into carriages or over mud puddles, or gives me any best place,... I have plowed, and planted, and gathered into barns, and no man could head me --- and ar'nt I a woman? I could work as much and eat as much as a man (when I could get it), and bear de lash as well --and ar'nt I a woman? I have borne thirteen children and seen 'amongst all sold off into slavery, and when I cried out with a mother's grief none but Jesus heard --- and ar'nt I a woman?"

(*The Norton Anthology*, p.196-97)

In this speech of unparalleled eloquence and candor Sojourner Truth raised issues that had hitherto been taken for granted. The sexual and racial stereotypes that had relegated the black woman to an existence where her labor was exploited and she herself considered a beast of burden were challenged by her. The central rhetorical question underlined strongly the difference in the life experiences of black women and white women. The latter who always 'had the best place' and were "carried over ditches" and were secure in the comforts of their luxurious homes could never identify with the shocking realities of a black woman's life and labor. Turning the denigrating stereotype of towering height and Amazonian strength of the black woman to an advantage that she should be proud of as an additional boon and a weapon she could utilize to counter male oppression, Sojourner Truth showed the budding feminists a new way to shape their one dimensional struggles for freedom from patriarchy and male domination. In this context bell hooks writes:

"Racist stereotypes of all the strong, superhuman black women are operative myths in the minds of many white women allowing them to ignore the extent to which black women are likely to be victimized in this society and the role white women may play in the maintenance and perpetuation of that victimization"

(*Feminist Theory*, 1994.p.13)

She posits that just as Betty Friedan's *The Feminine Mystique* ignores the existence of working-class women who were already in the labor force and could only long for leisure time and money that would allow them to stay at home and be housewives and for whom freedom meant liberty from the back-breaking routine of daily labor, so did most socialist feminists, while focusing on class and gender issues dismiss, exclude, or ignore the race problem, which was a stark reality for women belonging to the minority race. As Friedan "did not tell readers whether it was more fulfilling to be a maid, a babysitter, a factory worker, a clerk, or a prostitute than to be a leisure class housewife" (bell hooks, 1994. p.2) so did "privileged feminists" fail to take within the purview of theories they were shaping, the peculiar situation

of women of the minority race and their collective experience of racist discrimination in America. bell hooks brings to the fore sociological issues that have been conveniently overlooked by these feminists. Speaking from her personal experience she says that black women "who live daily in oppressive situations, often acquire an awareness of patriarchal politics from their lived existence, just as they developed strategies of resistance..." (bell hooks, 1994,p.19). The joy of being together and the bondage of sisterhood may be new to the white, middle-class burgeoning feminists but to black women like her, "sisterhood" was nothing new for "(she) had not known a life where women had not been together, where women had not helped, protected, and loved one another deeply..." (bell hooks, 1994,p.11). Finally, saying that her intention was not to undermine or "diminish" feminist struggle but to "enrich, to share in the work of making a liberators ideology and a liberators movement", bell hooks points out the peculiar dilemma of black women, who, she contends, must "recognize the special vantage point (their) marginality gives (them) and make use of this perspective to criticize the dominant racist, classist, sexist hegemony as well as to envision and create a counter hegemony"(bell hooks, 1994,p.15). The interesting parallel that bell hooks draws between the black man and the white woman exposes the inherent/inborn tendency in human beings to shift the burden of labor, responsibility and pain to a group whose social status is lower than theirs. In a perceptive study of the situation she writes:

"As a group, black women are in an unusual position in this society, for not only are we collectively at the bottom of the occupational ladder, but our overall social status is lower than that of any other group. Occupying such a position, we bear the brunt of sexist, racist and classist oppression. At the same time, we are the group that has not been socialized to assume the role of exploiter/oppressor in that we are allowed no institutionalized "other" that we can exploit or oppress... white women and black men have it both ways. They can act as oppressor or be oppressed. Black men may be victimized by racism, but sexism allows them to act as oppressors of women. White women may be victimized by sexism, but racism enables them to act as oppressors of black people."

(bell hooks, 1994,p.15)

It is not surprising therefore that the lived experience of black women would shape their consciousness in a manner different from those who have a relative advantage over them or even a relative degree of privilege compared to them. Their "world view" would therefore be different because it was churned out of a first-hand encounter with discrimination, oppression and exploitation. Bernice McNair Barnett's essay titled "Invisible Southern Black Women Leaders in the Civil Rights Movement: The Triple Constraints of Gender, Race and Class," where she has enlisted three "major biases" that have been encouraged and perpetuated by the dominant white society;

"(1) a negative problem-oriented image that stereotypically connects Black women with various pathologies within the family such as female-headiness, illegitimacy, teen pregnancy, poverty and welfarism (Barnett, Robinson and Bailey 1984; Hill Collins 1989; Higginbotham 1982;S scott 1982);

(2) a middle-class orientation that excludes, ignores, or makes inconsequential the experiences of the poor and working-class women, a large percentage of whom are Black (Bookman and Morgen 1988; Higginbotham 1982); and

(3) an apolitical-non-leadership image of black and poor women as political pessimists.

(*Race, Class and Gender* p.268)

Like bell hooks, Gerda Lerner have also arrived at the difference in meaning that women's liberation has meant for different women. She writes:

“Women, as all oppressed groups, perceive their status relatively, in comparison with their own groups, with previously known conditions, with their own expectations. White society has long decreed that while "woman's place is in the home", Black woman's place is in the white woman's kitchen. No wonder that many Black women define their own "liberation" as being free to take care of their own homes and their own children, supported by a man with a job (emphasis in original).”

(*Race, Class and Gender*, p.267)

Giddings asserts that "Black women had a history of their own, one which reflect(ed) their distinct concerns, values and the role they have played both as African-Americans and women."⁷⁴ Barnett quotes a black woman respondent whom she had interviewed in the course of finding out the role of black women political activists which indicated a "traditional gender stratification within Black society" that led to devaluation of women's roles:

When you are dealing with Black men and women and the fragile position of Black males, you can expect the Black women, even though they might do all the work, will not be recognized as doing the work or leading anything... Black women especially had to work hard, but never ever threaten the fragile position of their Black men. They still have to do this. (*Race, Class and Gender*, p.279)

Gloria Wayde Gayles writes in *No Crystal Stair* that the assumption that black and white women were "sisters in oppression" was a "problematic one" because the differences are obvious. One cannot overlook the traditional, historical fact that white women have participated actively and without coercion, in the oppression of black men and women. They have been "Ladies" who lived in leisure because black women have been "mammies". They have been protected and pampered, while black women have been dehumanized, brutalized and devalued as blacks and as females. (Gloria Wayde Gayles, *No Crystal Stair*, p.9)

4. STEREOTYPES AND COUNTER-STEREOTYPES

Images of African-American Women in African-American Fiction: In *Black Feminist Criticism*, Barbara Christian defines stereotype, whether positive or negative “as a by-product of racism...one of the vehicles through which racism tries to reduce the human being to a nonhuman level” because "stereotype is the very opposite of humaneness." (*Black Feminist Criticism*, 1985, p.16). African-American women could not therefore have avoided being projected as stereotypes either in society/ real life) or in literature (especially fiction where

there is scope for the fullest development of characters). The "invisibility" of the African-American woman in white American literature is not difficult to understand. As Elizabeth Schultz writes,

“On national wage scales she has always been the lowest paid; in national political life she has only recently been seen; in national statistics she is categorized as the unwed mother the welfare recipient, the maid; in national myth she is designated by multiple names all of which conceal her identity --- Aunt Jemima, Mammy, Matriarch, sometimes Sister, Black Bitch, Girl.”

(*What Manner of Woman*, p.316)

It has been traditionally accepted that unlike her white counterpart, the black woman has known within the confines of her own community a freedom from sexist categories but it was easy to overlook the fact that this "freedom" was so riddled with problems and so overridden with the burdens of feeding, clothing and holding the family together that more often than not, it was a freedom that they did not desire. As W.E.B. Dubois commented, it was a dubious freedom "thrust contemptuously upon them" for which the price they have paid is very dear. (Darkwater, Reprinted in *To be a Black Woman*, 1970.p.234-35) In an essay on the dominant images of Black American women in African-American literature, Barbara Christian traces the stereotypical images that had been constructed regarding the black women in both white American literature (Anglo American) as well as African American literature. The novels of slavery and Reconstruction periods including white American (esp. Southern White Literature) fashioned an image of the black woman with the ulterior motive of perpetuating the conflicts between men and black women and most importantly, to create “a dumping ground for those female functions a basically puritan society couldn’t confront.”(Christian, p.3) The politics of oppression that operated behind the projection of such images was condoned overtly as the audio visual media readily accepted and encouraged without hesitation the broadcast of these negative images.

Bell hooks writes that “Sapphire’s shrewish personality was used primarily to create sympathy in viewers for black male lot” and today it “is projected onto any black woman who overtly expresses bitterness, anger and rage against her lot.” This dominant image has caused many black women, “to repress these feelings for fear of being regarded as shrewish sapphires.” (bell hooks, *Ain’t I a Woman*, 1985.p.86). Another dominant image of the black woman was spawned by the generations of the myth of the “bad” black woman. Gerda Lerner shows how racist prejudice operated in indicting black women:

“Every black woman was, by definition, a slut according to the racist mythology; therefore to assault her and exploit her sexually was not reprehensible and carried with it none of the normal communal sanctions against such behaviour. A wide range of practices reinforced this myth: the laws against intermarriage; the denial of the title "Miss" or "Mrs" to any black woman; the taboos against respectable social mixing of the races; the refusal to let black women customers try on clothing in stores before making a purchase; the assigning of single toilet facilities to both sexes

of blacks; the different legal sanctions against rape, abuse of minors and other sex crimes when committed against white or black women.”

(Lerner, *Black Women in America*, p.163-64)

Historical records indicate that the sexual degradation of the black women by both black and white men could be possible because the conditions of poverty in the black community expose black women to the many dimensions of sex at an early age which has freed her from repression and enabled her to accept sexual relations without inhibition.(Schultz,p.328) This relative sexual freedom however has also been “contemptuously thrust upon her.” Only when one takes into account the conditions of poverty and work tedium of the black women can one appreciate the sexual freedom that she has been able to exercise. Ann Petry writes in *The Street*,

“... people were so damn poor they didn't have time to do anything but work, and their bodies were the only source of relief from the pressure under which they lived; and where the crowding together made the young girls wise beyond their years.” (1964.p.206)

The work songs on the other hand give a view apart from the master-slave relationship on which the narratives mostly focus. Here, the freedom of music that is intensely personal and not dependent on any external media to be spread, gave the scope for exploring relationships between black men and women. Here were to be found courting, love making, success and disappointment in love. Writes Christian,

“ Almost always the substances of the work songs about or by women are sifted through the cry of hard times and how that affects relationships: The men who caught trains and left for whatever reasons, the lack of money, the pervasive sense of danger, the need for a woman to be independent of men, an independence imposed rather than deserved, all shape the songs...slave narratives and work song alike project black women as caught in the vise of hard times, their spirits occasionally rising to the heights of heroism but more often tempered by the nibbling need to always be practical.”

(Christian, *Black Feminist Criticism*,p.7)

Most of the early fiction by black women writers concentrated on the experiences of black women in the rural South where these women served as drudges everywhere. A gradual shift in focus began with Ann Petry's *The Street* that represented for the first time, black women as labourers in the concrete tangles of the North --- the black city woman and her ghettoization and all the registration, recording of a new trend of victimization Anne Petry's *The Street* marks a change in the setting and tone in the literature of the black women. It brings the literature into the twentieth century, for the concrete plantation became the dwelling place of more and more blacks in this century. After the publication of this novel, the black city women could not be forgotten. The particular brand of slavery under which she exists meant that new changes in the literature would have to occur. Contemporary black women fiction writers/novelists have attempted to portray not only the complex struggles of black women's existence but the diversity and richness of their existence, from their own perspective. Here we encounter black women who have come forward to shed light on their situations, to discover their selfhoods and identities, to register and understand their growth, to examine “(their) relationship to men, children, society, history and philosophy as

she had experienced it.” (Christian,p.16) She is no longer ready to accept the set images that society and others have imposed upon her --- she has at last broken out of her mould to boldly envision new realities, new truths and new images for herself. There is no single monolithic image of the black women/ African-American women in the contemporary African-American black women's fiction.

According to Schultz, the celebration of the fact of survival and the search for freedom are two dominating aspects of African-American literature¹¹⁵ and against this backdrop must one view the work of contemporary African-American women writers whose subjects are mainly the complex reality of their black women characters and their struggles for achieving freedom and dignity. Claudia Tate writes that a dominant theme in black women's fiction “is the quest theme --- a character's personal search for a meaningful identity and for self-sustaining dignity in a world of growing isolation, meaninglessness and moral decay.” She continues:

"Black women writers project their vision of the world, society, community, family, their lovers, even themselves, most often through the eyes of black female characters and poetic personae. Their angle of vision allows them to see what white people, especially males seldom see. With one penetrating glance they cut through layers of institutionalized racism and sexism to uncover a core of social contradictions and intimate dilemmas which plague all of us, regardless of race or gender. Through their art they share their vision of possible resolution with those who cannot see."

(Claudia Tate, *Black Women Writers at Work*, 1983.p.xx)

The emergence of these black women writers has created a tradition in itself. Since the nineteen thirties African-American women novelists and poets have made a mark on the consciousness of not only black women but the whole world. Gwendolyn Brooks, Ann Petry, Dorothy west, Carolyn Rodgers, Paule Marshall, Maya Angelou, Toni Morrison, Mari Evans, Alice Walker, Gloria Naylor, Ntozake Shange, Gayl Jones, to name a few are writers of a new tradition who have created/ laid paths and travelled new roads by themselves. They have broken the conspiracy of silence, given voice to the muted black women and allowed their fullest development as characters in their novels. The richness of their own experience as black women in America have shaped their literary imagination and interwoven the fabric of their novels. New sociological and literary approaches to history (Hazel Carby's *Reconstructing Womanhood: The Emergence of the Afro-American Woman Novelist*, for example) become useful methods for reclaiming the past and forging culturally sensitive paradigms for the future.

5. DEBATES AND CHALLENGES

The poststructuralist deconstructionist debates of the 1970s dislocated the feminine subject as Autobiography became the site for major theoretical debates. The notion of a female selfhood and centrality of locus that could be liberated from a state of neglect or repression and be made visible through writing came to be questioned. This “crisis of the subject” despite the possibility of new representational spaces put the female subject in a

position of alterity and non-presence. The outcome was seen by feminist critiques as doubly negative for women, who at the precise juncture when they could have claimed subject position; saw the dissolution of the subject, which pushed them back to the marginal position. In this context, autobiographies and testimonials were important documents for black women writers and black feminist critics who attempted to reconstruct palimpsests in history, recover “lost” texts by their literary foremothers and acknowledge a maternal ancestry. While the dislocation of the female subject that hinted at the impossibility of autobiography as a creative genre seems to have gone against the grain of black women’s literary practice, Toni Morrison deployed the technique of “rememberize” in her novel *Beloved* (based on the true story of a fugitive slave Margaret Garner) where the repressed memories are recalled in a therapeutic and cathartic exercise, to open up new representational spaces.

The fallacy of essentialism that has plagued American white feminism as well as French *écriture féminine* ironically emerged as a problematic when black feminist writers like Hazel Carby and Audre Lord spoke about the absence of the lesbian presence and the sexual essentialism that rendered heterosexuality as normative. Gloria Naylor’s *Women of Brewster Place* and Alice Walker’s *The Color Purple* communicate the unspeakable experiences of lesbian women.

The shifting meanings of the ‘Black’ as a racial, cultural, national or political term and changing perspectives in the wake of postcolonial debates and issues has had crucial implications for black feminisms. Moraga and Anzaldúa’s *The Bridge Called My Back* is a crucial text that offers a scrutiny of class, race and cultural issues that question any notion of feminism as a stable place. The hegemony of United States is questioned and the difference between black Americans and Blacks highlighted as African-Americans are not a part of the third world. Critiques that acknowledge and accommodates of multiple black identities usher in new possibilities of representation.

(Kadiatu Kanneh, “Black Feminisms”, *Contemporary Feminist Theories*, 1998, p.86-97)

6. CONCLUSION

A unique diaspora and a peculiar and exploitative institution had laid the foundation of black women’s experience in America. A distinct and unique Black Feminist consciousness had triggered the emergence of a black women’s literary movement as a conscious move to counter centuries of misrepresentation. Black feminist insurgency succeeded in delinking itself from the larger rubric of Western feminism to set an example for posterity. Reverberations of Sojourner Truth’s question “And Ain’t I a Woman?” forged the sisterhood between lived experience and literary representations to reinforce the black feminist theoretical standpoint. Despite the sustained debates and continuing critique of contemporary American black feminism’s counter canon as well as the individualistic self-assurance of twenty first century African- American feminists and dichotomies within black feminism in America, the fact remains that black feminism, since its inception in America has been a pioneering subaltern position that questioned and subverted racist, classist, sexist hegemonies.

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Understanding The Nuances Of FDI In Online Market Place And Its Implication On Stakeholders

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Abstract

The government recently allowed 100 per cent foreign direct investment (FDI) through the automatic route in the marketplace model of e-commerce retailing, bringing in clarity on FDI policy for the sector as well as definition of marketplace format. Industry players, Evangelists and analysts see the notification issued by DIPP on FDI in online marketplaces as providing clarity on the issue. But, certain conditions that have been imposed will mean that some players in the business will have to change their operational models. The present study is an attempt to understand the subtle nuances of FDI in online market places and its implication on E-commerce players, Bricks and Mortars and SME's.

1. INTRODUCTION

The developments of Electronic Commerce applications origins back to the early 1970s and were primarily used within the financial sector. Innovations like EFT (Electronic Fund Transfer) were among the first, used mainly by large financial institutions. Then EDI (Electronic Data Interface) evolved, which extended the usage from solely financial transactions, to other types of business such as manufacturing. Later in the early 1990s, as the Internet became more commercialized and users rushed to participate in the World Wide Web, the term electronic commerce was invented (Turban et al., 2002).

The term *commerce* is by some defined as “transactions conducted between business partners”. However, using this definition within *e-commerce* (electronic commerce) might be too narrow. Therefore many also use the term *e-business* (electronic business), which also include serving customers, collaborating with partners, and electronic transactions within an organization (Turban et al., 2002).

E-commerce means sale or purchase of goods and services conducted over network of computers or TV channels by methods specifically designed for the purpose. Even though

goods and services are ordered electronically, payments or delivery of goods and services need not be conducted online. E-commerce transaction can be between businesses, households, individuals, governments and other public or private organizations. There are numerous types of e-commerce transactions that occur online ranging from sale of clothes, shoes, books etc. to services such as airline tickets or making hotel bookings etc.

As the potential of E-commerce was recognized its use also reached into other sectors. The trend according of intensively, increasing sales is persistent and areas such as music, books and tickets are predicted to have the largest increase.

The escalating development of e-commerce and e-business in the era of information technology has had its ups and downs. Recently the tone in media has been increasingly positive. From the negative tone during the early “pre-bubble” period, to a much more positive atmosphere in contemporary articles and research. The first gloomy forecasts about the so called *Hackers*, security faults, and unserious vendors, did well in implementing scares and lack of trust in the eyes of the customers.

The biggest e-commerce markets are U.S.A. followed by U.K. and Japan. In Asia, China, India and Indonesia are the fastest growing e-commerce markets. Major global e-Commerce companies are Alibaba.com, Amazon.com, Walmart, Apple, Dell, e-bay, Mercadolibre Inc., Rakuten Inc., Crate & Barrel, Symantec, Autozone, Microsoft, Gap, Nike, Disney stores, HP, ASOS PLC, Blue Nile Inc. etc.

E-commerce in recent times has been growing rapidly across the world. According to the report of Associated Chambers of Commerce and Industry (Assocham). India's e-commerce market is likely to touch \$38- billion-mark in 2016, a 67 per cent jump over the \$23 billion revenue it clocked last year. Increasing internet and mobile penetration, growing acceptability of online payments and favourable demographics has provided the ecommerce sector in India the unique opportunity to companies connect with their customers. According to the Assocham's latest report, Buying trends during 2015 have witnessed a significant upward movement due to aggressive online discounts. India's e-commerce market was worth about \$3.8 billion in 2009; it went up to \$17 billion in 2014 and to \$23 billion in 2015 and is expected to touch \$38-billion mark by 2016.

Industry sources indicate that this growth can be sustained over a longer period of time as e-commerce will continue to reach new geographies and encompass new markets.

The bookings done through electronic communication could be Business to Business (B2B) or Business to Consumer (B2C). **Business to Business i.e. B2B** is e-commerce between businesses such as between a manufacturer and a wholesaler or between a wholesaler and a retailer. As per the WTO report WT/COMTD/W/193, global B2B transactions comprise 90% of all e-commerce. According to research conducted by USA based International Data Corporation, it is estimated that global B2B commerce, especially among wholesalers and distributors amounted to US\$12.4 trillion at the end of 2012.

The bookings done electronically between **Business to Consumer** for purchase or sale of goods and services are known as **B2C e-commerce**. Although B2C e-commerce receives

a lot of attention, B2B transactions far exceed B2C transactions. According to IDC, global B2C transactions are estimated to have reached US\$ 1.2 trillion at the end of 2012, ten times less than B2B transactions. B2C e-Commerce entails business selling to general public/ e-catalogues that make use of shopping place. There are several variants in B2C model that operate in e-commerce arena.

From the business point of view, there are two models of e-commerce:

- **Marketplace based model of e-commerce-** Marketplace based model of ecommerce means providing of an information technology platform by an ecommerce entity on a digital & electronic network to act as a facilitator between buyer and seller.
- **Inventory based model of e-commerce-** inventory based model of ecommerce means an e-commerce activity where inventory of goods and services is owned by e-commerce entity and is sold to the consumers directly.

2. SCENARIO OF INDIAN E-COMMERCE INDUSTRY

The unrivalled population in India armed with smart gadgets is spoilt for a choice. Aided by declining broadband subscription prices and launch of 3G and 4G services, consumers have become the driving force of e-Commerce in the country. From buying groceries to furniture, movie tickets, trains tickets to steel, coal and tea – e-Commerce has empowered the consumers. As per reports, India will see more people come online than any other country in the next 15 years. With digital device and social media, online sellers are getting unprecedented opportunity for growth and have thus become continuously more attractive for investors. Even though B2C is getting all the attention B2B is not far behind. Both in Direct and Online Marketplace B2B have significant presence. The marketplace model gives customers a plethora of choice and the best prices under a single platform. It also gives vendors a level playing field. Most B2B players have tied up with banks and financial institutions for supply chain finance that helps in improving access to credit.

B2B e-Commerce has brought in efficiency, convenience, choice, reach and lower transactional cost for buyers. For SMEs, a B2B portal is one of the best things that have happened. For any SME, marketing and advertising costs are huge and many do not have adequate technical expertise to reach out to larger markets. Those areas are now taken care by B2B portals. Basically, B2B wipes out the weaknesses of SMEs. Having a B2B platform takes care of the distribution, advertising and gives access to markets. B2B has enabled SME's growth in sales and helped them acquire new customers. The steady growth of e-Commerce in the country is, is poised for a big leap in the next four years, according to a report by the Confederation of Indian Industry and Deloitte Touché Tohmatsu India LLP. While the business to business (B2B) segment is expected to more than double from \$300 billion in 2014 to \$700 billion in 2020, the business to consumer (B2C) segment will grow more than seven times from \$13.6 billion to \$101.9 billion, the report said. The growth in B2C e-commerce will be supported by a spurt in number of online shoppers, from 20 million in 2013 to 220 million in 2020, as well as a three-fold increase in average spending by online shoppers, from \$147 in 2013 to \$464 in 2020. The

report, however, has a word of caution for online retailers who have splurged on discounting to acquire customers, a move that has helped them increase gross sales. Combined losses for e-commerce companies such as Flipkart Ltd, Snapdeal (Jasper InfoTech Pvt. Ltd) and Paytm (One97 Communications Pvt. Ltd) last year stood at \$557 million, the report said.

“A majority of B2C e-commerce companies, globally, despite being operational for 5-20 years, report low profitability. The situation in India is no different, i.e., a growing gross merchandise (GMV) value but at an overall loss as the e-commerce companies establish themselves,” the report says.

“This trend however does not hold true for the B2B e-commerce companies which are profitable with greater GMV values. The higher profitability in the B2B segment is attributed to reasons such as lack of heavy discounts, greater emphasis on quality rather than on price, and higher volumes of purchases,” it added.

A valuation correction is underway in the domestic e-commerce segment. Morgan Stanley Institutional Fund Trust, a mutual fund investor in Flipkart, slashed the value of its holding by as much as 27% to \$58.9 million as of 31 December, down from \$80.6 million in June 2015, Mint reported on 27 February. Another mutual fund T Rowe Price has cut the value of its stake in Flipkart by 15%, Mint reported on 16 April.

In context, India’s retail opportunity is substantial and spurred by several factors such as the demographic dynamics (hyper-connected young population, rising standards of living and upwardly mobile middle class), deeper internet penetration, explosion of social-media platforms, and increased smartphone penetration. Thus, a significant growth of e-Commerce is imminent in the next two years.

3. GUIDELINES ON FOREIGN DIRECT INVESTMENT IN E-COMMERCE

Last year, the Retailers Association of India and the All India Footwear Manufacturers & Retailers Association filed petitions in the Delhi High Court alleging that e-commerce companies were circumventing FDI rules using the marketplace model.

In January, the DIPP told the Delhi High Court that the marketplace model is “not recognised” in the FDI policy. It also said that it was up to the Enforcement Directorate to investigate whether FDI rules had been violated by online retailers. The Centre’s latest clarification, which clears the air, has been criticized by the Confederation of All India Traders. As per the guidelines issued by the Department of Industrial Policy and Promotion (DIPP) on FDI in e-commerce, contained in the Consolidated FDI policy circular 2015, foreign direct investment up to 100% under automatic route is permitted in the marketplace model of e-commerce retailing— an arrangement where e-commerce companies provide an online platform to other vendors to sell their products, bringing in long overdue clarity on FDI policy for the sector as well as definition of marketplace format. No FDI is permitted in *inventory-based model* of e-commerce.

This ends the policy ambiguity that had led to litigation and uncertainty for foreign investors as well as domestic e-retailers. Global e-commerce majors such as Amazon and

eBay as well as domestic players with foreign investments such as Flipkart and Snapdeal, which have been operating through the marketplace model, can breathe easy as their activities have been legitimized.

Other conditions in nutshell

- i) Digital & electronic network will include network of computers, television channels and any other internet application used in automated manner such as web pages, extranets, mobiles etc.
- ii) Marketplace e-commerce entity will be permitted to enter into transactions with sellers registered on its platform on B2B basis.
- iii) E-commerce marketplace may provide support services to sellers in respect of warehousing, logistics, order fulfilment, call centre, payment collection and other services.
- iv) E-commerce entity providing a marketplace will not exercise ownership over the inventory i.e. goods purported to be sold. Such an ownership over the inventory will render the business into inventory based model.
- v) An e-commerce entity will not permit more than 25% of the sales affected through its marketplace from one vendor or their group companies.
- vi) In marketplace model goods/services made available for sale electronically on website should clearly provide name, address and other contact details of the seller, Post sales, delivery of goods to the customers and customer satisfaction will be responsibility of the seller.
- vii) In marketplace model, payments for sale may be facilitated entity by the e-commerce in conformity with the guidelines of the Reserve Bank of India.
- viii) In marketplace model, any warranty/ guarantee of goods and services sold will be responsibility of the seller.
- ix) Ecommerce entities providing marketplace will not directly or indirectly influence the sale price of goods or services and shall maintain level playing field.
- x) Guidelines on cash and carry wholesale trading as given in para 6.2,16,1,2 of the FDI policy will apply on B2B e-commerce

4. FDI IN ONLINE MARKET PLACE AND ITS IMPLICATION ON STAKEHOLDERS

The clause that online marketplaces cannot influence the pricing of products sold on their platforms as per the recent FDI guidelines for e-commerce retail, is giving sleepless nights to the \$11-billion online retail industry. In layman's terms, not being able to influence pricing would mean the end of attractive discounts on online marketplaces such as Flipkart and Snapdeal. Can e-commerce companies afford to completely do away with discounts? As per a report by the Boston Consulting Group, 45 per cent of Indians shop online to avail discounts. Marketplaces buy merchandise from brands at regular prices and sell at huge discounts to the consumers. So, a pair of Nike shoes that a customer buys from an online marketplace for a cool 20 per cent off, may have actually been given to the

online store at a 10 per cent discount. The online marketplace would have discounted it further to lure customers.

It is this deep discounting strategy that has led to the exponential growth of online retail in India, albeit at the expense of physical retail. In fact, brands selling on these marketplaces have, since the past year, mandated that discounts are offered only on their older merchandise. Attractive discounts, ability to compare brands, the convenience of cash on delivery and an easy return policy have wooed Indian consumers to these platforms.

Much before the FDI guidelines came through, marketplaces were beginning to reduce their discounts as they were burning huge amounts of funds, with profitability being nowhere in sight. Most of these marketplaces, be it Flipkart (raised \$3.4 billion) or Snapdeal (raised \$2 billion) have raised huge amounts of money from foreign investors and, hence, come under the FDI purview.

5. IMPACT ON E-COMMERCE GIANTS

Curb on cash burning:

E-commerce in India has now thrived for almost half a decade and that too largely by way of offering huge discounts to buyers. However, the latest move by the Narendra Modi-government, restricting e-commerce marketplaces from directly or indirectly influencing the sale price of goods or services, may turn out to be a litmus test for these players. While, the Department of Industrial Policy and Promotion, in its notification on Tuesday, has not used the words “discount” or “predatory pricing”, the new rules indicate that companies such as Flipkart, Amazon or Snapdeal cannot sell anything below the selling price. This means, the companies will have to either stop offering discounts in any form or go back to restructure their business models. It is a known fact that the discounts offered by the online marketplaces today are funded by burning cash that comes from PEs/VCs, something which offline players are dead against as they have not been able to compete with the online retailers. Ecommerce players may have to focus on more value-added services to stay ahead of the competition.

E-commerce firm will not be permitted to sell more than 25 per cent of total sales from one vendor or its group companies. :

According to the notification, an e-commerce firm will also not be permitted to sell more than 25 per cent of total sales from one vendor or its group companies. This will prevent marketplaces from behaving like pseudo retailers and ensure that they stay true to their claim of being ‘technology platforms’. Also, e-commerce companies will not directly or indirectly influence the sale price of goods or services and shall maintain a level playing field; the warrantee or guarantee of goods and services will be the seller’s responsibility. An e-commerce marketplace may, however, provide support services to sellers in respect of warehousing, logistics, payment collection and other services. Online retailers will also have to broad base their vendors with the DIPP placing a cap on the goods/service that can be sourced from a single vendor. This is good news for the many small vendors who have been losing out as large e-tailers source much of their stock from few select vendors. E-trailers may also feel the heat as the new guidelines may not go well with their PE/VC

investors. On one side, while they will save money with lesser discounts, on the other they may lose revenue. The rule helps Snapdeal the most, The Company has been set up as a true marketplace from the very beginning. Flipkart and Amazon will both be affected. For Flipkart, WS Retail (a former Flipkart subsidiary) accounts for over 25% of its purchases. Flipkart will have to rely less on WS Retail, which should suit its own decision to become more like Alibaba in China (a marketplace) rather than Amazon in the US (inventory-led B2C model). For Amazon again, it will have to ensure that Cloudtail, which is partly owned by Amazon, will have to be less than 25% of sales. Nasscom said the cap of 25 per cent on sales by a single vendor in a marketplace may prove to be restrictive, more so if the vendor sells high value items. "The industry might face difficulties in case of sale of electronic items, where a vendor may be offering exclusive access to certain items or discounts. Marketplaces have no control on how a product is priced and only organise 'sales' where vendors participate.

6. IMPACT ON BRICK AND MORTAR RETAILERS

The Brick and Mortar have welcome the decision of allowing FDI in online marketplaces, a move that will ostensibly come as a relief to ecommerce companies such as Flipkart, Amazon India and Snapdeal but the conditions imposed have been hailed as a victory by their brick-and-mortar rivals. The government said in a press note, clearly defining 'marketplace'. This ends the uncertainty over the business model being used by India's biggest online retailers which has been challenged in court by brick-and-mortar stores. The FDI policy had previously left the term undefined. The government also appears to have taken a firm stance against deep online discounting to protect neighborhood stores. The government also feels that if any portal is providing discounts on goods it's holding, then it amounts to inventory based model, which is in contradiction to the marketplace definition. Traditional retailers welcomed the clarification, arguing that this would put an end to what they said was unfairness inherent in the current system. The consumer electronics and cell phone makers, which are among the hardest hit by ecommerce discounts, are hoping Tuesday's notification on pricing parity will put an end to predatory pricing in the industry and lead to sustainable growth of ecommerce marketplaces. The industry has been up against online discounting, since almost 70%-75% of online sales in the country were generated from mobiles, televisions and other electronics, mostly on the back of discounts, which had impacted sales of brick-and-mortar retailers.

Kumar Rajagopalan, CEO of Retailers Association, a group representing brick-and-mortar retailers, said marketplaces cannot play 'pseudo retailers' any longer. "They cannot be influencing prices, they cannot be calling themselves as dukaan, they cannot be dealing with one of their suppliers dramatically, which are nothing but their own retailers.

7. IMPACT ON SMALL AND MEDIUM ENTERPRISES (SMEs)

The advent of online marketplaces presents the Indian SME sector an unprecedented growth opportunity. For the first time, SMEs have a level playing field with bigger

enterprises to access new markets and tailor their offerings to customer preferences at almost no incremental cost. More than two lakh early SME adopters of e-commerce are unleashing a silent revolution in the country by riding this wave and, as digital adoption increases, these numbers are set to grow exponentially.

Currently, there are approximately 48 million SMEs in India, employing around 40 per cent of the country's labour and contributing 17 per cent of India's GDP. Indian SMEs have long suffered on account of systemic constraints which have prevented them from tapping new markets, access new capital, adopt technology and scale their businesses. However, this narrative is changing quickly, often left unnoticed in the high-decibel growth of e-commerce. Snapdeal recently released a study in partnership with KPMG titled 'Impact of Ecommerce on SMEs in India' which found that with a mere investment of Rs 3,000 on an average, SMEs can successfully enter the e-commerce space. Around 27 per cent of Indian SMEs that have a web presence and use e-commerce have reported 49 per cent more profits, 7 per cent broader customer base and a whopping 60-80 per cent of spend reduction. These opportunities are being leveraged by small and medium-sized retailers and manufacturers dealing in all kinds of goods — electronics, fashion, home décor, and so on. They are being initiated into online inventory management, digital payments, new-age packaging, data analysis-based inventory and pricing planning as they learn to do business with online marketplaces.

The government is actively taking initiatives to help in overcoming awareness barriers, technological hurdles, funding and training barriers that surround the SME sector. The enthusiasm among SMEs, online marketplaces and the government is based on proven models in global markets such as China. A recent study by Credit Suisse showed that the Indian economy with its current level of internet penetration and demographics is at a similar inflection point at which the Chinese economy was 8-10 years back. Today, 8.5 million+ SMEs sell through Alibaba's platform in China, Which also includes farmers, traditional craftsmen and homepreneurs. Drawing further parallels, we are witnessing similar energy from all sectors, including traditional handicraftsmen, home bakers, micro enterprises and first generation businessmen. Another encouraging trend is that this growth is very broad-based. Snapdeal alone has sellers registered from more than 500 cities and towns of India. The outlook for the SME sector has never looked this bright ever before. The latent need of SMEs to grow is coming to the surface and they are being actively hand-held by marketplaces to achieve their business goals.

8. MANAGERIAL IMPLICATION

The implication of FDI in online market place will have cascading impact on E-commerce players, Brick and mortars and consumers. Ecommerce market places will try to leverage loopholes in the system to offer discounts, which may not be that attractive as before. Even if they give sellers discounts on listing price, and concessions to use their warehousing and logistic services, the discount they will ultimately pass on to the consumers won't be more than 4-5 per cent. Among other tactics to survive in an

environment of no discounts, e-commerce companies could offer discounts through digital wallets. All big marketplaces have their own e-wallets - Flipkart has FX Mart and Snapdeal has Freecharge, adoption of digital wallets is steadily increasing. Some of the existing players may need to revamp their operational structures to meet these norms. "Although some of the structures practiced by existing players may require alteration, it will give much needed clarity to undertake business with certainty in the longer term. Online marketplaces will now have to focus on value-added services and improving margins.

9. CONCLUSIONS

The FDI guidelines have sprung up umpteen challenges for online retailers, leaving them with little choice but to reinvent, unless they succeed in lobbying with the government to turn the guidelines in their favour.

The guidelines are a step towards creating a level-playing field for online and offline retailers. "The healthiest thing to do is collaborate with various brands or retailers of this country and truly behave like a marketplace. They should behave like malls online.

Marketplace models are perfect for India, which is the land of Lilliput, with myriads of small buyers and small sellers. The share of the organized sector or of known brands within it is very small. India Inc. has not invested in mega factories to get huge economies of scale to play the high-volume low-margin game that Consumer India demands. There is also far more innovation and customer intimacy in the offerings of the millions of small suppliers than in large companies (just take a walk around pavement markets and small shopping centres in your city), and they don't have the money or the knowhow to expand their footprint and showcase their wares. And a marketplace connecting the two lands of Lilliput has got to be a winner.

In the marketplace model the marketplace owner has to slog to provide value-added services to its suppliers and to scour the face of the earth for interesting supply that adds value to customers. However from a customer perspective, what we have is a mall owner who is not responsible for his tenants' behaviour. He does enable them to do better by offering many kinds of business assistance that a physical mall owner doesn't even dream of but in the end it is a "buyer beware" situation and yet untested at large scale. Will consumers understand the idea of an emarket place to evaluate the difference between supplier X and supplier P as they do in Lajpat Nagar in south Delhi or Manish Market in south Mumbai? Or do they think it's all from the Snapdeal shop, without a care to where the stuff comes from? The Snapdeal founders have said they will keep working on the business model till they get it right, so we can expect the core customer-facing issue of "who is in charge out here, whose brand is giving me the guarantee of trust and quality and service" to be addressed alongside all the steps they are taking to serve suppliers better (king-size sheets packed into queen-labelled boxes was my experience). The middle majority of customers suffer in silence than complain, unless you provide them clear avenues and encouragement to do so. Any marketplace must serve both parties. Perhaps a

stock exchange inspired listing agreement would be a good idea. Finally we needn't worry too much about whether a business is pure-play or not. India is about hybridism, consumers believe in "this AND that", not "this OR that". We want to be, and have been spoilt so far, by high-tech as well as high-touch. I am a seasoned online buyer but I also want to physically see the five types of vacuum cleaners listed and talk to someone even virtually on whether the steam mop will work. The dharma of business is to add value and extract value from consumers, not drag them kicking and screaming to some supply-side notion of business model pristineness.

10. LIMITATIONS OF THE STUDY AND DIRECTIONS FOR FUTURE RESEARCH

As the E-commerce and online shopping trend is growing in leap in bounds, the trend will continue to evolve irrespective of the Impact of FDI on ecommerce market. The study has some limitations, providing pointers for future research. Firstly in long run, eventually government policies or regulations on ecommerce market may change in future and some of the existing laws would cease to exist. Such policies could be studied to under their impact on all the stakeholders. Secondly, the norms and Implication of FDI in Ecommerce were identified from leading newspapers, magazines and the website of DIPP. No experts were contacted in this regard. Therefore, the norms and government regulation on FDI can be shared with experts in the field of ecommerce and then qualitative research technique, such as Delphi technique could be used to gain insights on the impact of FDI in ecommerce. Thirdly quantitative research to identify the perception of retailers (Brick and mortar stores), Consumers and E-commerce players for the norms of FDI in ecommerce can be undertaken. Fourthly, this study is limited to the ecommerce of Indian market. Similar studies can be undertaken for other emerging economies in the world and further, a comparison could be done.

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Parasitic Boost Circuit Technique To Overcome Voltage SAG

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Abstract

POWER quality (PQ) problems have obtained increasing attentions as they can affect lots of sensitive end-users including industrial and commercial electrical consumers. The voltage sag compensator, based on a transformer-coupled series-connected voltage-source inverter, is among the most cost-effective solution against voltage sags. When voltage sags happen, the transformers, which are often installed in front of critical loads for electrical isolation, are exposed to the disfigured voltages and a dc offset will occur in its flux linkage. In this paper, a new topology of series-connected compensator is presented to mitigate long duration deep sags, and the compensation ability is highly improved with a unique shunt converter structure acting as a parasitic boost circuit that has been theoretically analyzed. Additionally, the proposed active voltage quality regulator is a cost effective solution for long duration sags that are lower than 50% of the nominal voltage as it is transformer less compared with the traditional dynamic voltage restorer.

1. INTRODUCTION

The fulfillments of the industrial goals were possible only because the modern industries were able to find innovative technologies that have successfully become technological developments. Continuous production throughout the period is ensured only when the

final objective is to optimize the production while achieving maximum profits and achieving minimized production costs. The reason for demanding high quality un-interruptible power during production process is mainly because of the modern manufacturing and process equipments that operate at high efficiency requires stable and defect free power supply for the successful operation of their machines. Machines, sensitive to power supply variations are to be designed more precisely. For instance, some instruments like adjustable speed drives, automation devices, power electronic components etc. fall into the above category.

Following mentioned are some aberrant electrical conditions that can disrupt a process caused both at the utility and the customer end.

- i.) Voltage Sags
- ii.) Phase Outages
- iii.) Voltage Interruptions
- iv.) Transients due to Lighting loads, capacitor switching, nonlinear loads, etc.
- v.) Harmonics

The industries may undergo burned-out motors, lost data on volatile memories, erroneous motion of robotics, unnecessary downtime, increased maintenance costs and burning core materials especially in plastic industries, paper mills & semiconductor plants as an outcome of the above irregularities. The solutions put forth as a consequence of the above mentioned anomalies are called as utility based solutions and customer based solutions respectively. The finest examples for those two types of solutions are FACTS devices (Flexible AC Transmission Systems) and Custom power devices that are based on solid state power electronic components. FACTS devices are controlled by the utility, whereas the Custom power devices are operated, maintained and controlled by the customer itself and installed at the customer premises.

2. TOPOLOGY AND PRINCIPLE

As shown in Fig. 1, the PB-AVQR topology is mainly consists of five parts, including a static bypass switch (VT1, VT2), a half-bridge inverter (V1, V2), a shunt converter (VT3, VT4), a storage module (C1, C2), and a low-pass filter (L_f , C_f). The operating mode and applied control strategies are similar to what have been described. Under normal operating conditions, the static bypass switch is controlled to switch on and the normal grid voltage is delivered directly to the load side via this bypass switch. When an abnormal condition is detected, the static bypass switch will be switched OFF and the inverter will be controlled to inject a desired missing voltage in series with the supply voltage to ensure the power supply of sensitive loads. There are totally two different kinds of control strategies in the proposed PB-AVQR system. When the grid voltage is lower than the rated voltage, an in-phase control strategy will be adopted and a phase-shift control strategy will be applied when the supply voltage is higher than the nominal voltage.

Working principle of the PB-AVQR is different compared with that of the DySC due to its unique shunt converter structure. When the proposed configuration is analyzed, both the

operating states of the switches (V1, V2) and the trigger angles of the thyristors (VT1, VT2) should be taken into consideration. So, a simplified PB-AVQR (SPB-AVQR) circuit shown in Fig. 2 where two thyristors (VT3, VT4) in the proposed PB-AVQR are replaced by two diodes (D1, D2), is firstly introduced to better explain its working principles. The following analysis will be based on the SPB-AVQR which can be regarded as a special type of PB-AVQR.

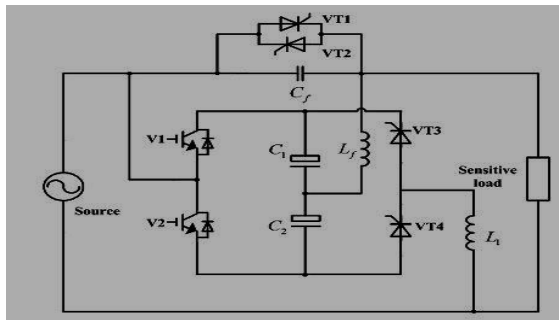


Figure 1: Proposed PB-AVQR topology

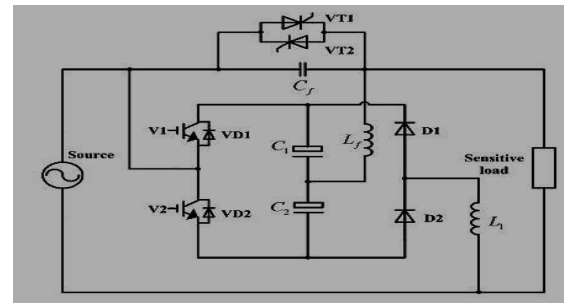


Figure 2: SPB-AVQR topology

The only difference between these two configurations is that the shunt converter of the PB-AVQR is controllable while the shunt converter of the SPB-AVQR is uncontrollable. That is to say, the dc-link voltage of the SPBAVQR represents the upper limit of the dc-link voltage in the PB-AVQR structure. So, theoretical conclusions drawn with the SPB-AVQR are basically applicable to the PB-AVQR. As shown in Fig. 2, switches V1 and V2 are now also parts of the parallel circuit, which means that the dc-link voltage will be affected by the on/off status of the switches. So, the turn on and turn off conditions of the compensation process should be considered to understand the working principles about the parasitic boost circuit of the SPB-AVQR. Figs. 3 and 4 illustrate four different operating conditions of the SPB-AVQR within one switching cycle during the positive and negative half-cycle of the sinusoidal supply voltage separately. Both the compensation process and charging process can be explained based on these operating conditions.

In Figs. 3 and 4, the solid line means that there is current flowing through and arrows depict directions. Operating conditions during the positive half-cycle are illustrated in Fig. 3. When V2 is switched on, as shown in Fig. 3(a), the grid charges the inductor L1 via the diode D2 and the capacitor C2 discharges to maintain the load voltage. When V2 is switched off, as shown in Fig. 3. (b), the energy stored in the inductor during previous period is released to dc-link capacitors C1 and C2 through VD1 which is the anti-parallel diode of V1. Operating conditions during the negative half-cycle are given in Fig. 4. When V1 is switched on, as shown in Fig.4 (a), the inductor L1 is charged via the diode D1, and the load is compensated by the capacitor C1. When V1 is switched off, as shown in Fig. 4(b), the energy stored in L1 is released through VD2, which is the anti-parallel diode of V2, to capacitors C1 and C2. So, in each half-cycle of the grid, one capacitor of the dc-link discharges to provide the energy needed for the compensation, and this energy is actually obtained from the supply source via the charging process described earlier. Apparently, the charging circuit of the proposed configuration works exactly like a boost

circuit and the dc-link voltage in this situation is controlled by the duty ratio of the two switches.

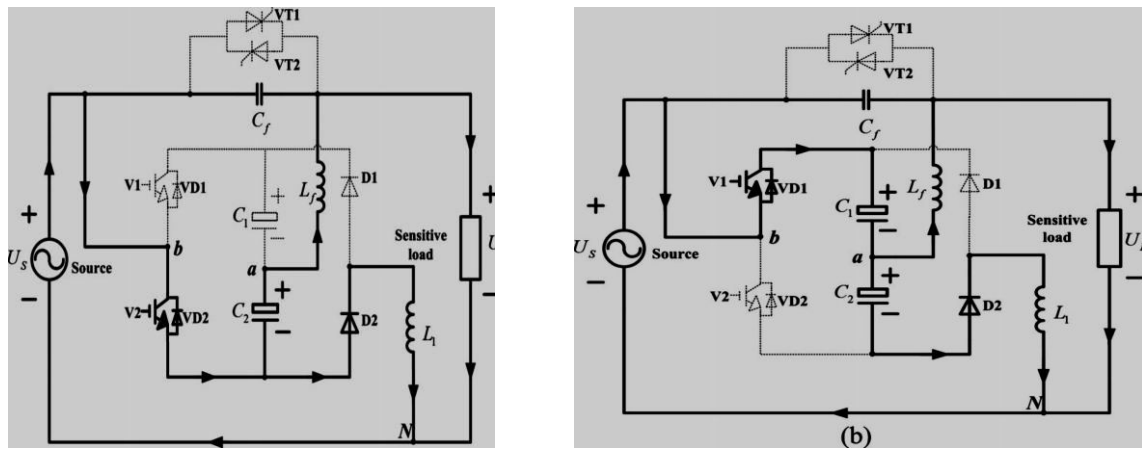


Figure 3: Operating conditions during positive half-cycle. (a) V2 switched on. (b) V2 switched off.

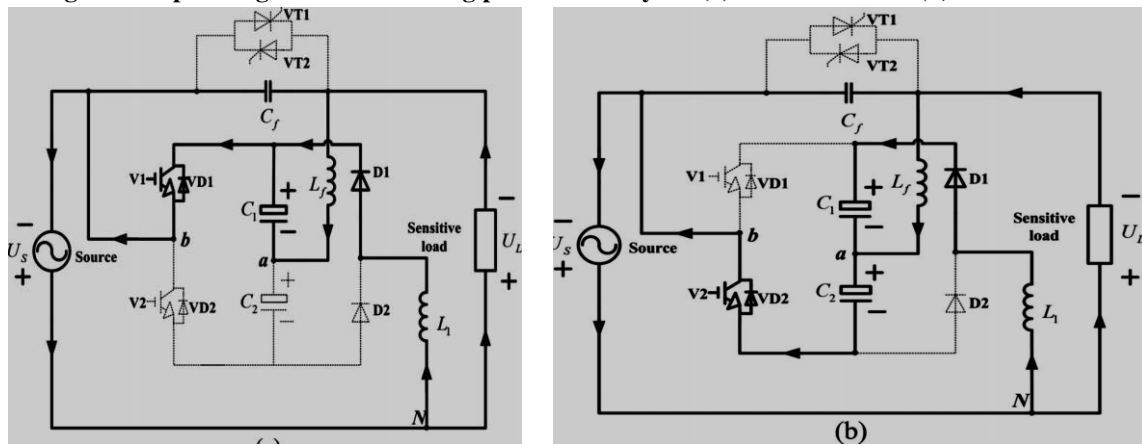


Figure 4: Operating conditions during negative half-cycle. (a) V1 switched on. (b) V1 switched off.

So, the compensation ability of the SPB-AVQR is theoretically unlimited as long as the grid is strong enough to provide the needed power. However, as the boost circuit is parasitic on the series inverter, and the two switches are actually controlled according to the missing voltage, there still exist some restrictions. The relationships between the dc-link voltage and other system parameters will be discussed in the next section. In Figs. 3 and 4, two endpoints of the inverter are marked as a and b. Parts of the waveforms obtained at the inverter side and load side under four operating conditions are schematically shown in Fig.5, where U_{aN} represents the voltage between a and N. As shown in Fig.6, when V1/V2 is switched on/off, the dc-link voltage will be added/subtracted to the supply voltage to get a switching pulse voltage U_{aN} and the switching harmonics of U_{aN} will be filtered by L_f and C_f to get a smooth load voltage. So, the load voltage will be maintained at its rated value if the inverter is properly controlled according to the required missing voltage during sags.

3. MODELING AND THEORETICAL ANALYSIS

DC-link voltage is a key parameter to evaluate the compensation ability about a series compensation device since it decides the maximum value of the injected compensation

voltage. In this section, in order to evaluate the compensation ability of the proposed topology and verify its feasibility in mitigating long duration deep sags, relationships between the dc-link voltage and other system parameters will be derived based on the circuit model of the aforementioned operating conditions. As can be seen from Figs. 4 and 5, working principles during the positive and negative half-cycle of the supply voltage are the same, so the following analysis will be focused on the situation in the positive half-cycle. The control strategy applied for voltage sags is in-phase compensation, so the energy needed to maintain the load voltage in one half-cycle can be expressed as follows

$$E_0 = \frac{T_0 \Delta V}{2V_{\text{ref}}} P_0$$

Where T_0 is the grid voltage period time, V_{ref} is the rated rms value of the load voltage, P_0 is the rated load power, and ΔV is the rms value of the missing voltage. In steady-state compensation, the energy needed for the compensation should completely be provided by the residential grid which is also the charging energy through the parasitic boost circuit in this case.

4. MATLAB/SIMULINK RESULTS

In order to show the validity of the proposed PB-AVQR, simulation and experimental results are presented in this section. The simulation results are based on the MATLAB software and the experimental results are based on a 2 kW single-phase prototype. System Parameters. There are mainly four parameters need to be designed, namely the dc-link capacitor C_1 / C_2 , the filter inductor L_f , the filter capacitor C_f , and the charging inductor L_1 . During the steady-state compensation, one capacitor discharges at the switched-on position and two capacitors are both charged at the switched-off position in each switching cycle.

Furthermore, C_1 and C_2 discharge, respectively, in the negative and positive half-cycle of the supply. So, if the two capacitors are treated equally during the charging process, the energy-balance equation that required for the capacitors can be written as

$$\frac{T_0 \Delta V}{4V_{\text{ref}}} P_0 = \frac{1}{2} C_{1(2)} V_{\text{dc}}^2 - \frac{1}{2} C_{1(2)} (V_{\text{dc}} - v_{\text{dc}})^2$$

Where v_{dc} is the fluctuation voltage of V_{dc} . In the theoretical analysis, the dc-link voltage is assumed to be a constant, so $v_{\text{dc}}/V_{\text{dc}}$ here is limited within 5% at the voltage drop of 50% to minimize the overall dc-link voltage ripple. In this way, the estimated minimum value of C_1 / C_2 can be calculated with V_{dc} substituted by the dc-link set value $V_{\text{dc-set}}$. How to set the dc-link value is introduced in [25] and in this paper it is given as

$$V_{\text{dc-set}} = \begin{cases} 1.2 \times \sqrt{2}(V_{\text{ref}} - V_S) + 40 & V_S < V_{\text{ref}} \\ 1.5 \times \sqrt{2}(V_S^2 - V_{\text{ref}}^2) + 40 & V_S > V_{\text{ref}} \end{cases}$$

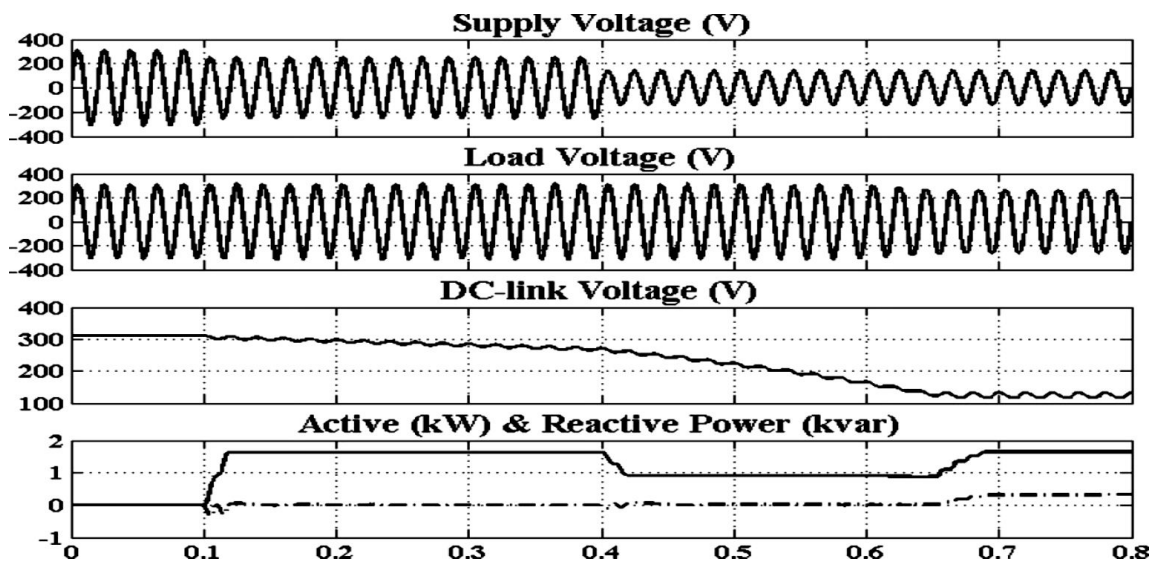


Figure 5: Simulation result of the DySC.

As shown of the charging current will get larger at the same time. So, charging inductance L_1 is designed as a result of the compromise between the compensation ability and the charging current peak value. The main function of the output LC filter in the proposed structure is to eliminate the harmonic components of the injected compensation voltage. The value of L_f and C_f are designed according to its natural frequency and several other criterions which are given as follows in Figs. 9–12, a higher dc-link voltage will be obtained with a smaller L_1 , but the peak value

$$\begin{cases} \frac{1}{2\pi\sqrt{L_f C_f}} = \chi f_s \\ L_f < \frac{v_L}{\omega_0 I_{L \max}} \\ C_f < \frac{I_{\text{ripple}}(\chi^2 + 1)}{8V_{dc} f_s} \end{cases}$$

where f_s is the switching frequency, v_L is the voltage drop across the inductor L_f at $I_{L \max}$, $I_{L \max}$ is the maximum value of the load current, I_{ripple} is the maximum ripple current of the filter and χ is the coefficient between the switching frequency and the filter's natural frequency. Generally, χ ranges from 0.05 to 0.2. The PB-AVQR system's key parameters are listed in Table I according to the design principles mentioned earlier.

5. MATLAB/SIMULINK RESULTS

Fig shows the simulation results of the DySC topology with different supply voltages. In the simulation, the supply voltage drops to 180 V at 0.1 s and then falls to 100 V at 0.4 s. As shown in Fig.5, when the supply voltage is 180V, the DySC can effectively compensate for the voltage sag; however, when the supply voltage drops to 100 V, the load voltage becomes not sinusoidal as the maximum injected compensation voltage is limited by the low steady-state dc-link voltage. Fig. 5 also indicates that the DySC can only mitigate deep sags for a few line cycles depending on the energy stored in dc-link capacitors as its steady-state dc-link voltage is always lower than the peak value of the

supply voltage. The graphics of the active and reactive power are also included in Fig. 5. When the supply voltage is 180 V, the dc-link voltage does not reach its steady state value with limited simulation time, so the active power of the supply is lower than the load power and its value is about 1.6 kW. When the dc-link voltage reaches its steady-state value with 100 V supply voltage, the active power of the supply is about 1.65 kW which means that the load voltage is no longer maintained. The simulation results of the proposed PB-AVQR topology under the same condition is shown in Fig. 6 As can be seen in Fig.6, when supply voltage changes,

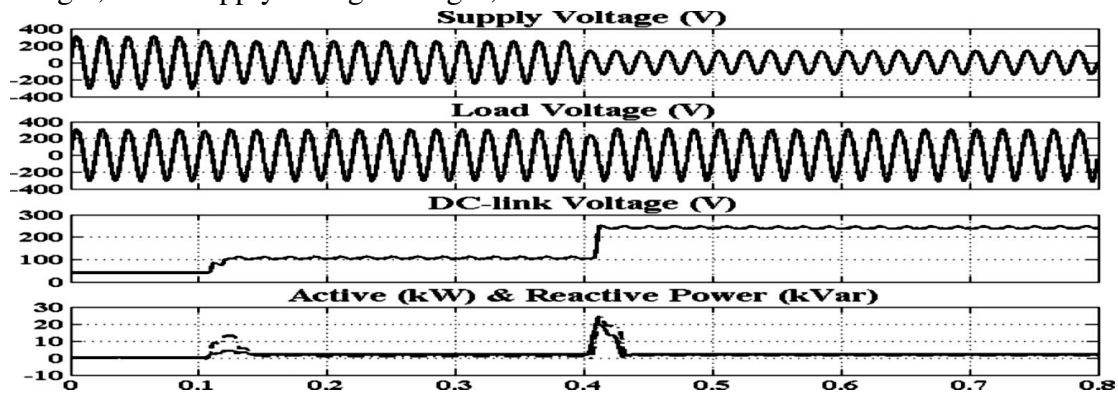


Figure 6: Simulation result of the PB-AVQR

The compensation even with a 100V supply voltage. Fig. 6 also indicates that the transient response here is not very good, but this can be improved by increasing the set value for dc-link voltage. The active power of the supply during the steady-state compensation is 2 kW, and it is the same as the load power which means that the load voltage is effectively ensured. The reactive power during the steady-state compensation is about 1.1 kvar with 180 V supply and is about 1.4 kvar with 100 V supply. The reactive power of the proposed PB-AVQR is higher than that of the DySC due to the dc-link voltage adaptive control method. Additionally, the instantaneous value of the active and reactive power can be suppressed by properly designing V_{dc} -set and the charging time of the capacitors.

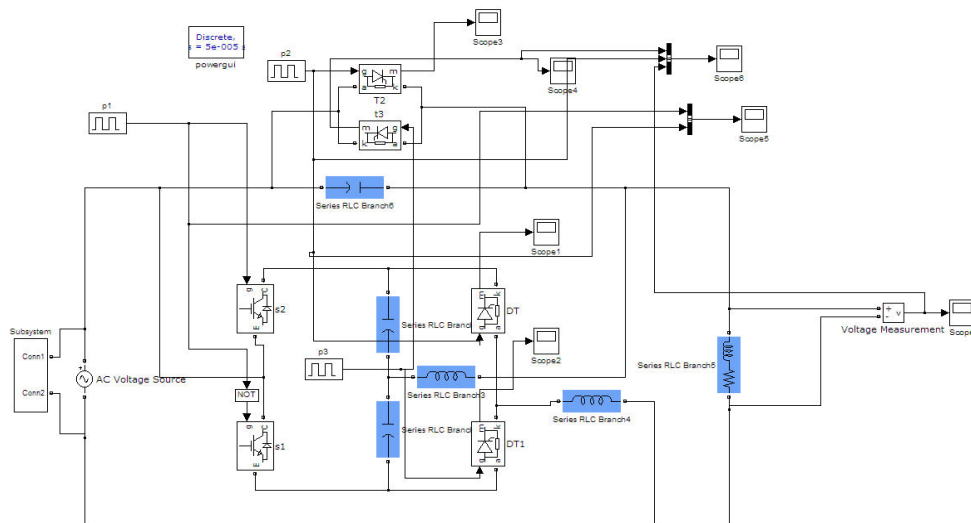


Figure 6: Matlab model

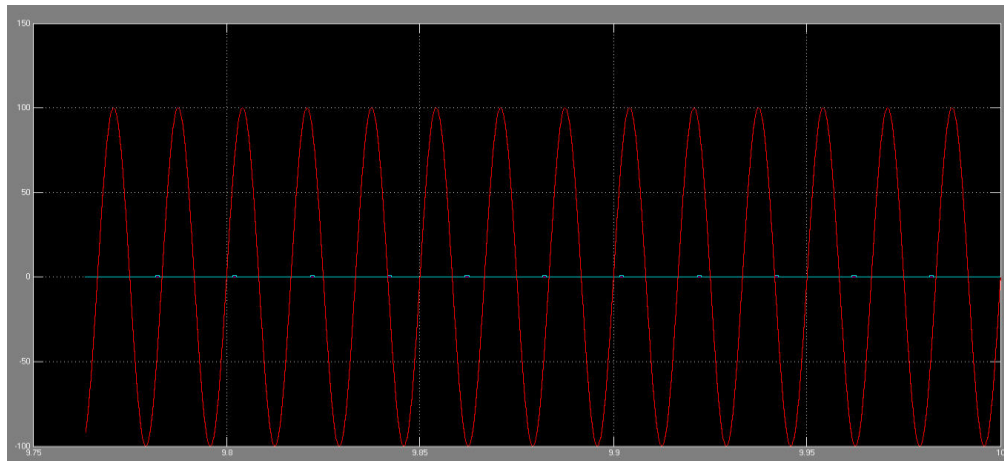


Figure 7: Waveform of the PB-AVQR with a 100 V supply voltage.

6. CONCLUSION

This paper has presented a novel transformer less active voltage quality regulator with parasitic boost circuit to mitigate long duration deep voltage sags. The proposed PB-AVQR topology is derived from the DySC circuit and the compensation performance is highly improved without increasing the cost, weight, volume, and complexity. It is a relatively cost-effective solution for deep sags with long duration time compared with the traditional DVR topology with load-side-connected shunt converter as a series transformer is no longer needed. The working principle and circuit equations are given through theoretical analysis. Simulation and experimental results are presented to verify the feasibility and effectiveness of the proposed topology in the compensation for long duration deep voltage sags that are lower than half of its rated value. The operating efficiency of the proposed PB-AVQR system also remains at a relatively high level as the dc-link voltage adaptive control method is adopted. In a conclusion, the proposed PB-AVQR topology in this paper provides a novel solution for long duration deep voltage sags with great reliability and compensation performance.

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Experimental Analysis Of Single Point Cutting Tool Using Different Cutting Fluids

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Research Area

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KeyWords

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Abstract

In this paper comparative performance analysis of dry turning, wet turning and minimum Quantity lubrication (MQL) turning processes area unit studied on experimental platform. Experiments area unit perform on AISI 4130 MS bars so as to judge the performance in terms of cutting forces, to optimize the cutting parameters like cutting speed, depth of cut and feed rate. Cutting forces , tool temperature and surface roughness measured for various combination of cutting parameters supported experimental set up, From the experimental results, this research, planned the optimum cutting parameters, and analyzed the consequences of cutting parameters on surface roughness tool temperature and cutting forces within the dry, wet, MQL and wet turning processes.

1. INTRODUCTION

Metal cutting measure one in all the necessary and wide used producing. In metal cutting, there measure several factors associated with method designing for machining operations. These factors will be classified as:

- The type of machining operations (milling, turning, facing.),
- Parameters of machine tools (rigidity, horse power, etc.),
- Parameters of cutting tools (geometry material, etc.),
- Parameters of cutting conditions (cutting speed, feed rate, depth of cut, etc.),
- Characteristics workpiece (material, geometry, etc.).

Among these factors cutting parameters (speed, feed rate and depth of cut) and geometry of tool (back rake, side rake) measure are dominating ones during a machining operation. In Single pass turning to optimize the surface roughness the selection of efficient machining parameters like machining speed, feed rate and depth of cut contains a direct impact within the metal cutting processes. The geometry of tool like back rake, side rake additionally slightly affects the surface roughness. In engineering industries presently, there's a wide-scale analysis on turning parameter improvement, minimising quantity of lubricants in metal removing operation and improve surface roughness in turning method.

➤ Problem Definition

Temperature at the cutting point of the tool is a crucial parameter in the control of the machining process. Temperature of cutting point tool effect on tool life, surface roughness of the work piece and tool wear .To reduce the above problem it is required to create optimized temperature at single point cutting tool. To achieve this we will use different cutting fluids & find the best one.

2. LITERATURE SURVEY

Many researcher are studying the influence of various parameters like cutting speed, feed, depth of cut, tool geometry, work piece hardness, tool temperature, tool vibration, types of cutting environments, types of cooling lubricants, surface finish, tool wear, tool life, material removal rate, chip formation, work piece hardness, chip tool interaction, cutting zone temperature with different types of work piece material and size, tool material, tool geometry and with different levels of parameters in turning simultaneously parallel to this in order to optimize this parameters different optimization techniques have been introduce and regression equation and mathematical models have been found out also FEA modelling and FEA software are used in order to simulate the turning process and find out effect of cutting parameters on cutting forces, effective stress, temperature, chip formation and tool wear in turning. Depth of cut is the most influencing parameter affecting three cutting forces followed by feed rate and cutting speed is least significant not significant for regression model of cutting force[1-5]. In hard turning surface roughness improved when the cutting speed increased and feed speed increases the surface roughness values also increases [6]. Respiration and skin problems are the main side effects of metal working fluids [MWFs] [7]. Types of occupational risks associated with MWFs, which became airborne and formed aerosol during machining and showed that these risks were numerous and widespread it is, therefore, important to find a way to manufacture products using the sustainable methods and processes that minimize the use of MWFs in machining operations. In addition, it is essential to determine the optimal cutting conditions and parameters, while maintaining long tool life, acceptable surface finish and good part accuracy to achieve ecological and coolant less objective [8]. MQL caused a significant reduction in tool wear and surface roughness as compared to dry and wet turning. If we consider only surface roughness and cutting force, MQL turning has more advantages than wet turning [9, 10]. The review of the literature suggests that the construct of MQL

presents itself as a doable resolution for machining in achieving minimum tool wears whereas maintaining the cutting forces/power at cheap levels, if the MQL parameters will be strategically tuned. the main aim of this this work was to through an experimental investigation comparative performance analysis of dry turning, wet turning and minimum Quantity lubrication (MQL) turning processes studied on experimental platform in terms of tool temperature, surface roughness and cutting forces.

3. MATERIAL AND METHODOLOGY

A. Workpiece Material

AISI 4130 MS material is being widely used for various industrial applications so experiments is been carried out by turning cylindrical AISI 4130 MS bars with a diameter of 60 mm and length of 12 cm on lathe machine at different cutting speeds, feeds and cutting depths under dry wet and MQL conditions.

Table 1: Chemical composition of workpiece

Grade	C(%)	Mn(%)	Si(%)	P(%)
AISI4130	0.30	0.52	0.24	0.017
Grade	S(%)	Cr(%)	Ni(%)	N(%)
AISI4130	0.011	1.06	0.017	0.22

B. Cutting Tool

Uncoated carbide, Back Rake Angle 12°, Side Rake Angle 12°, End Relief 10°, End Cutting Edge Angle 30°, Side Cutting Edge Angle 15°, Nose Radius 0.8mm.

Table 2: Pressure and Flow of Coolant in Turning

Sr.No	Cutting Fluid	Cutting Fluid	Pressure (Bar)	Flow(Ml/Hr)
1.	Dry	—	—	—
2.	WET	Blasocut	2	1 L/Hr
3.	MQL	Soyabean	2	50
4.	MQL	Blasocut	2	50
5.	MQL	Groundnut	2	50
6.	MQL	Sunflower	2	50

C. Selected Level for Experiments

Parameters	Level 1	Level 2	Level 3
Spindle speed, m/min	34.27	53	79.73.
Feed rate, mm/rev	0.35	0.40	0.45
Depth of cut, mm	0.5	1	1.5

D. Cutting force and surface roughness measurement

Kistler 9257B2 dynamometer is used for cutting forces measurement and surface roughness is measured by portable stylus-type surface roughness measuring instrument.



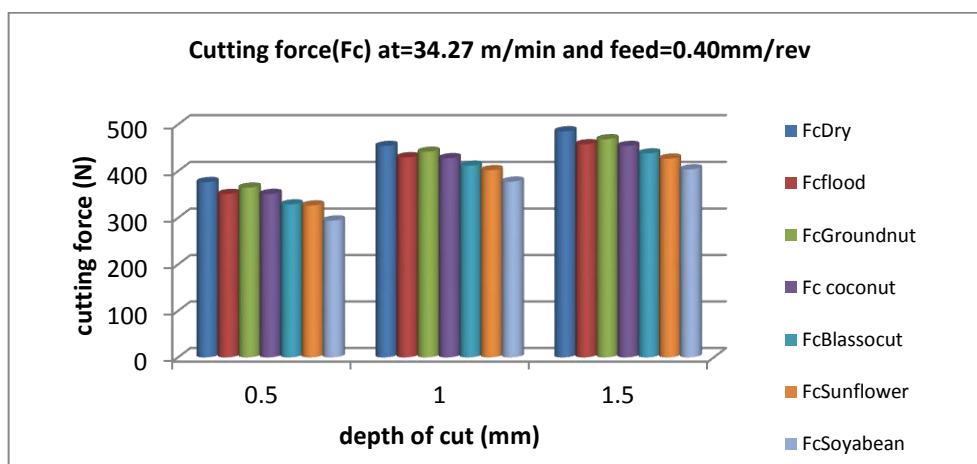
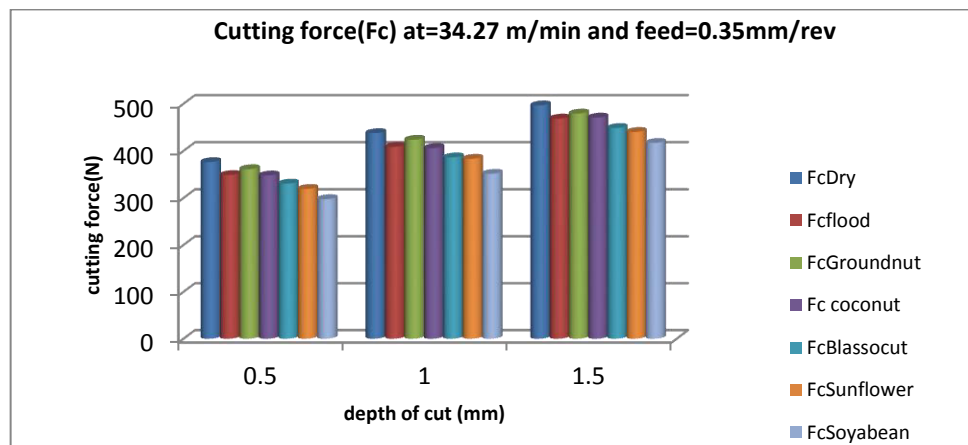
Figure 1: Conventional lathe machine

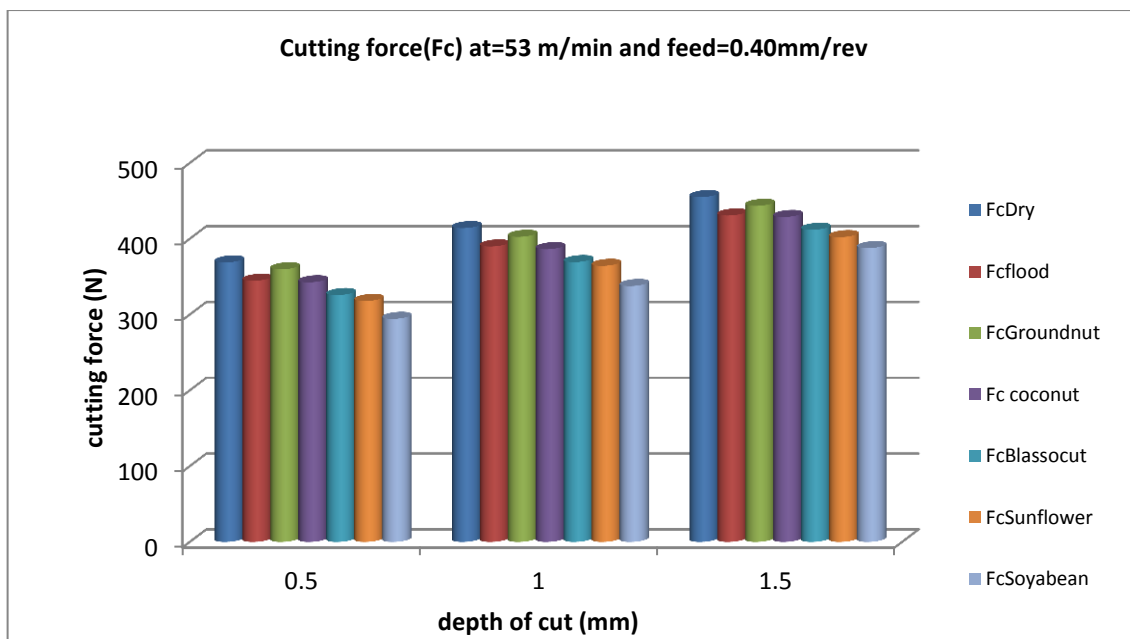
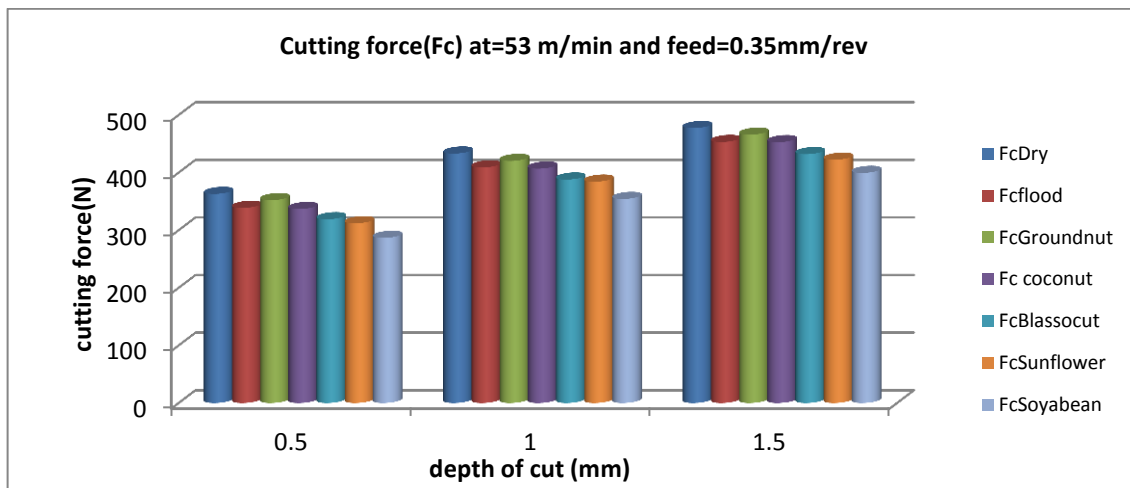
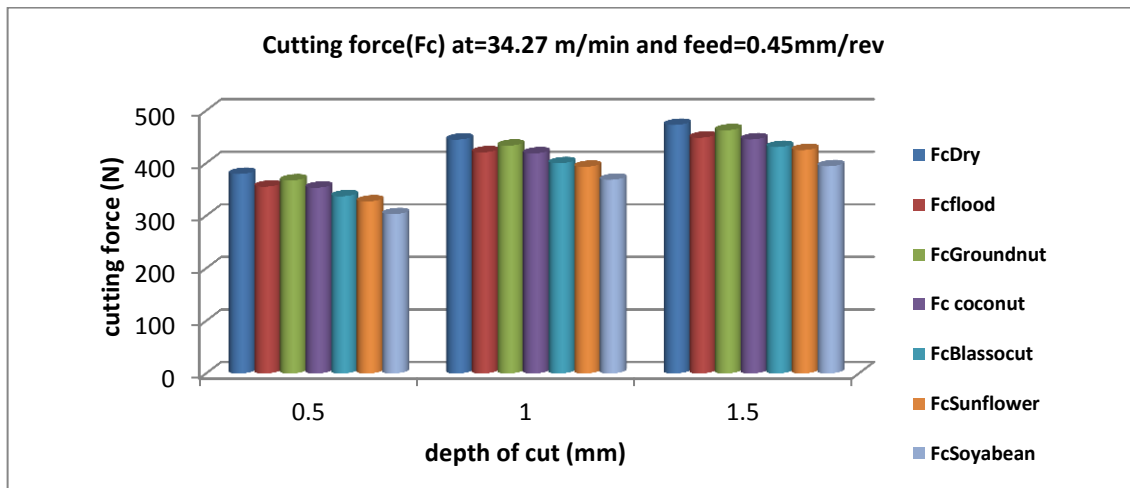
F. Specification of Lathe Machine

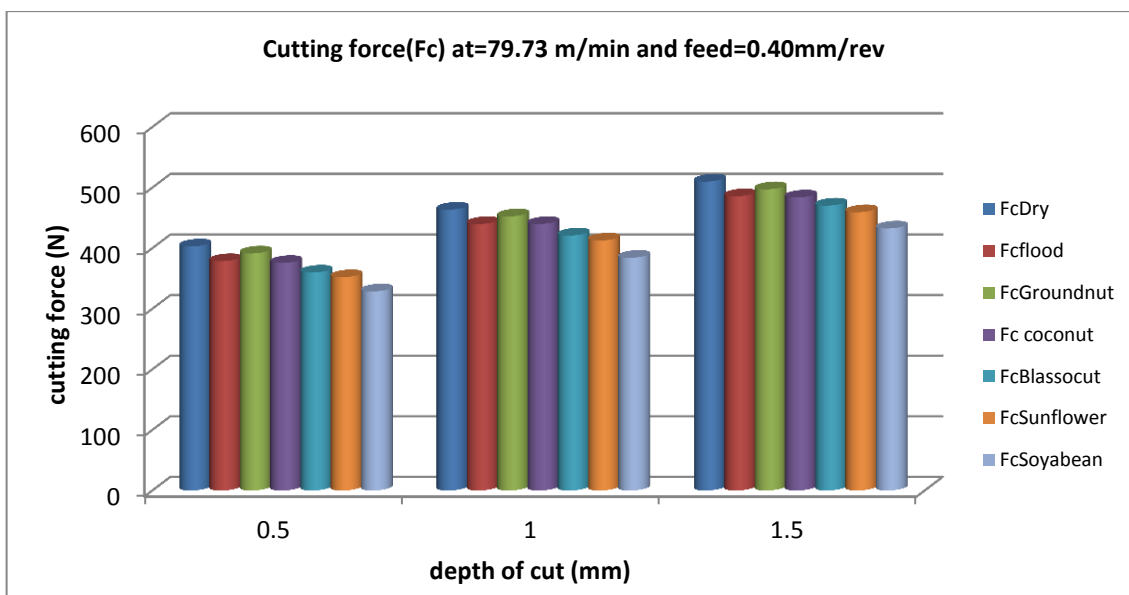
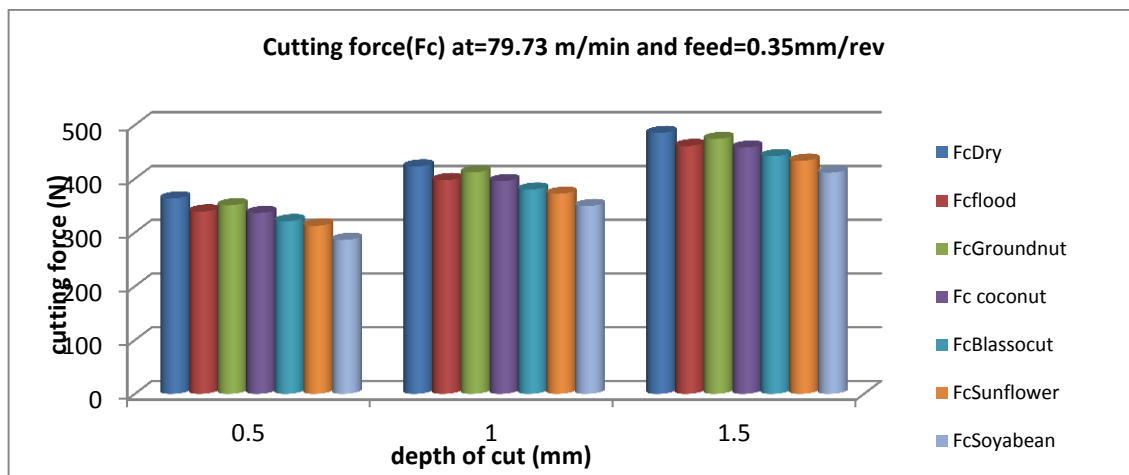
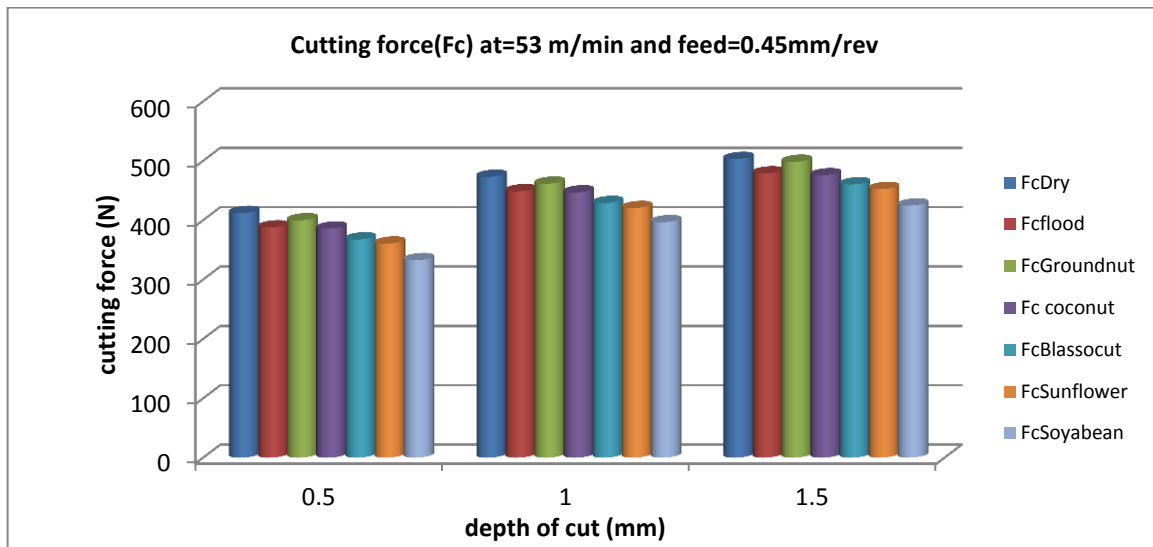
The turning experiments were conducted on a lathe machine shown in figure is powered by 2HP motor and speed range 47-1600RPM.

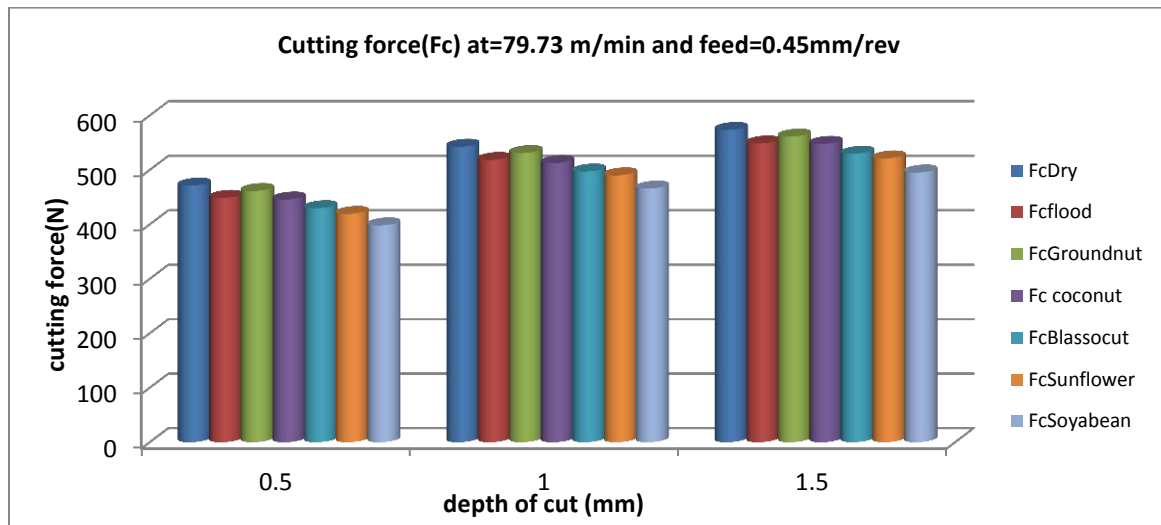
4. EXPERIMENTAL RESULTS AND DISCUSSION

Graph 1: Variation of cutting force(F_c), at different velocity 34.27,53,79.23 mm/min at different depth of cut and different feed rate at 0.35,0.40,0.45 mm/rev in dry, flood and MQL .

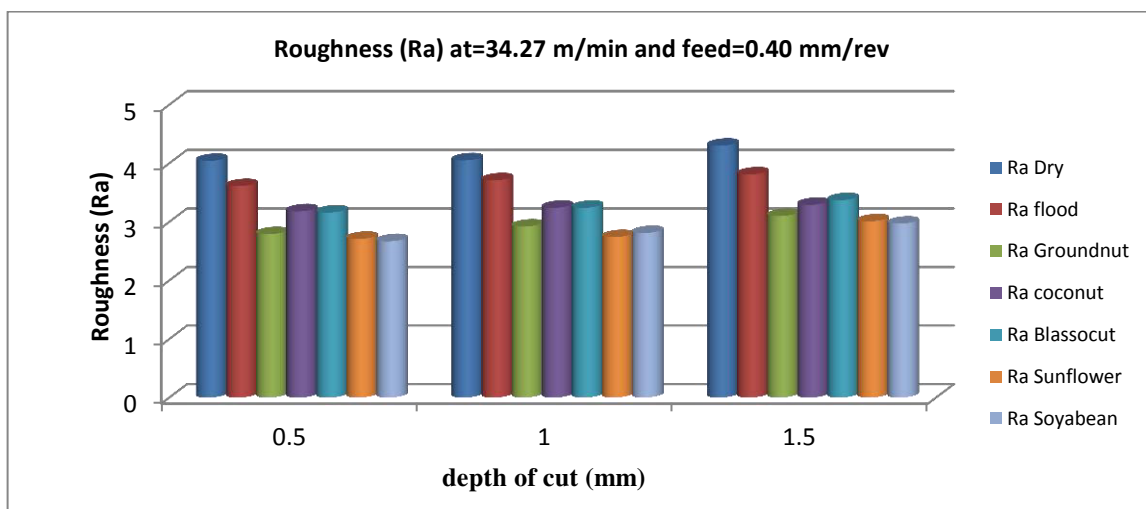
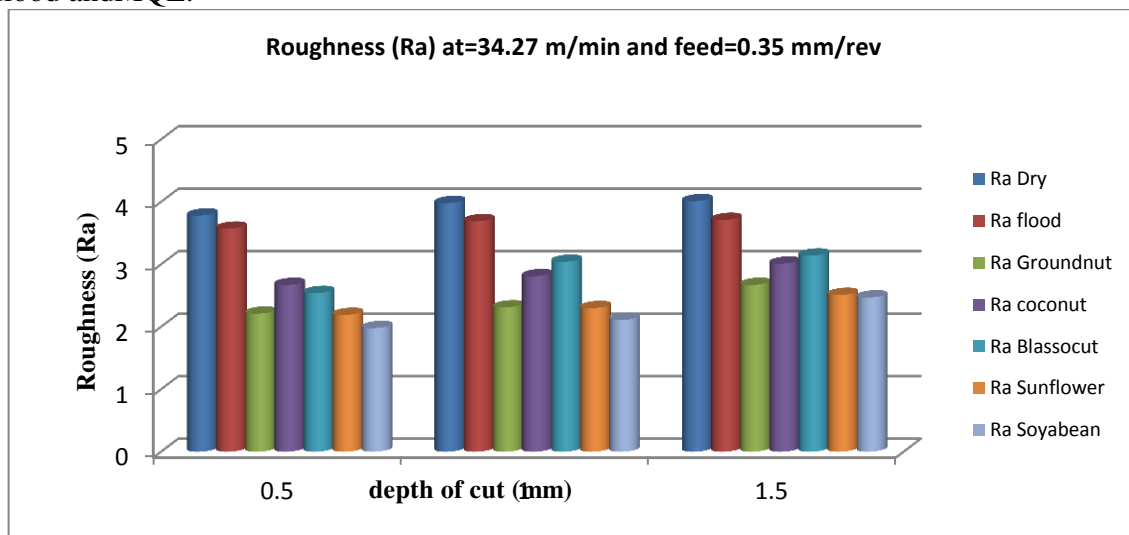


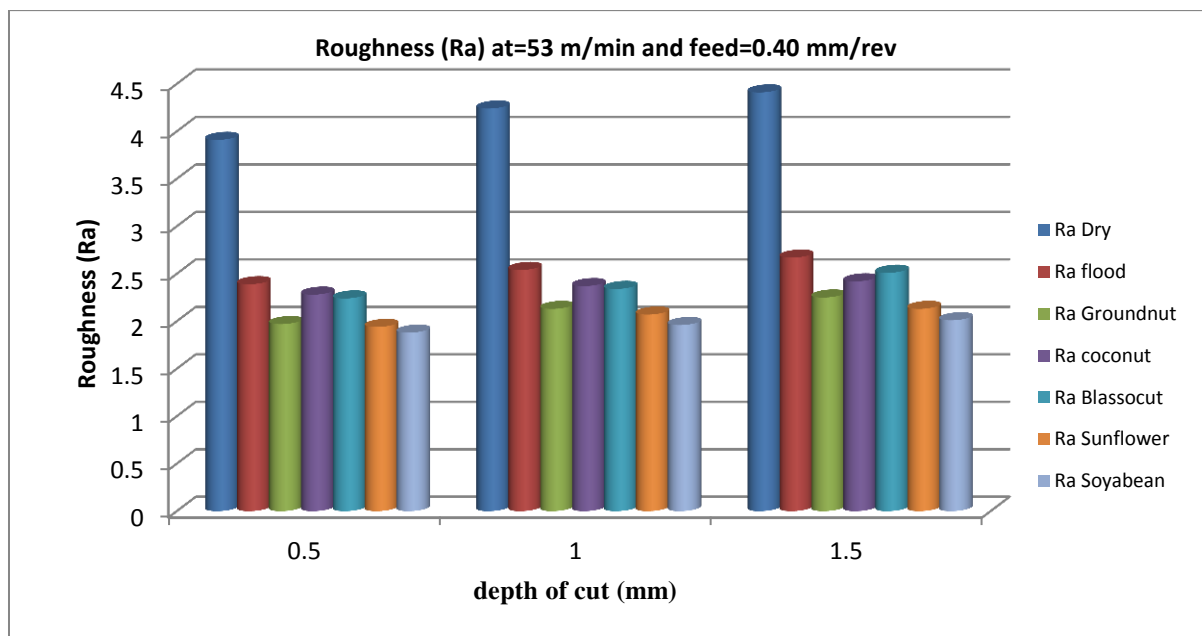
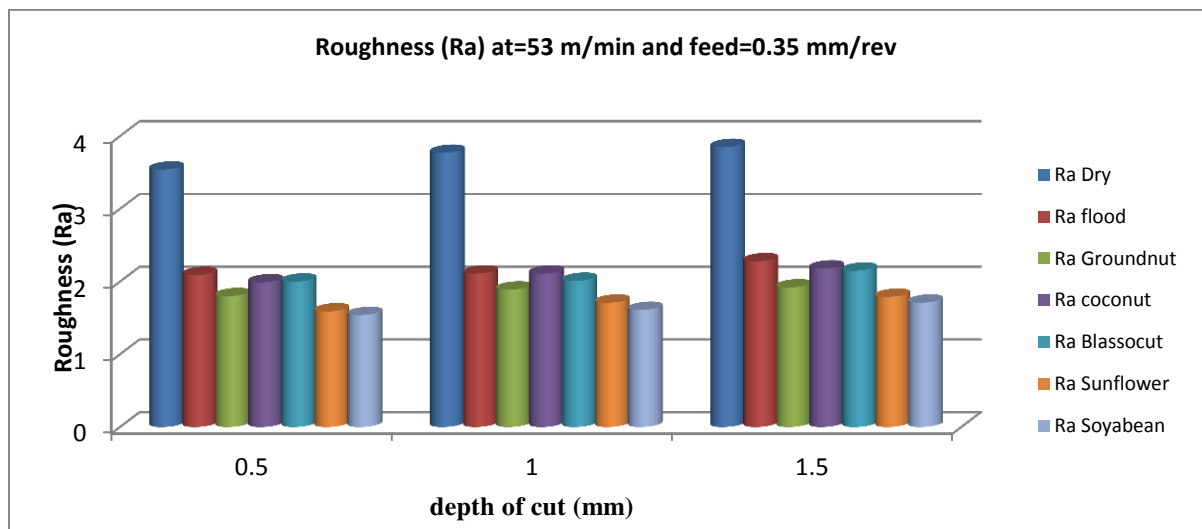
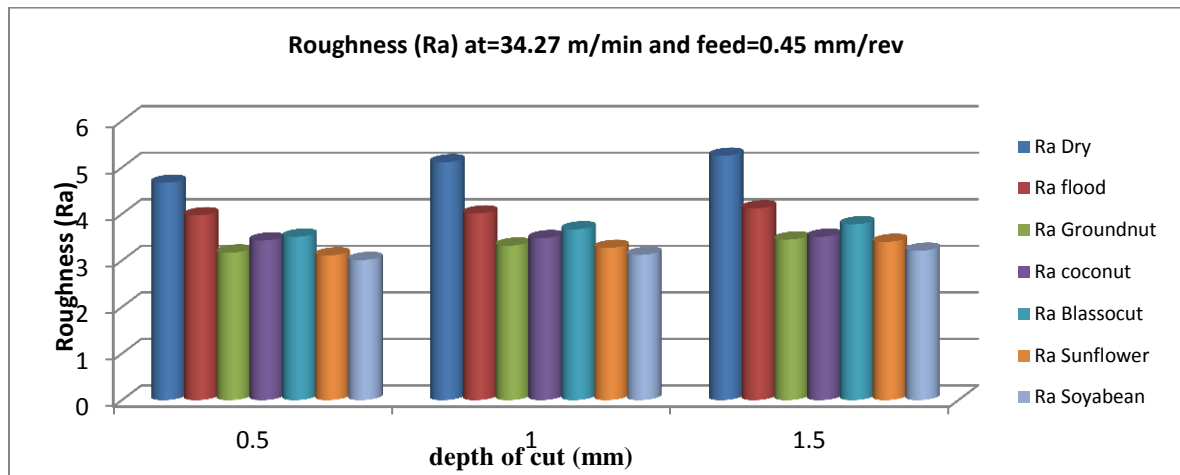


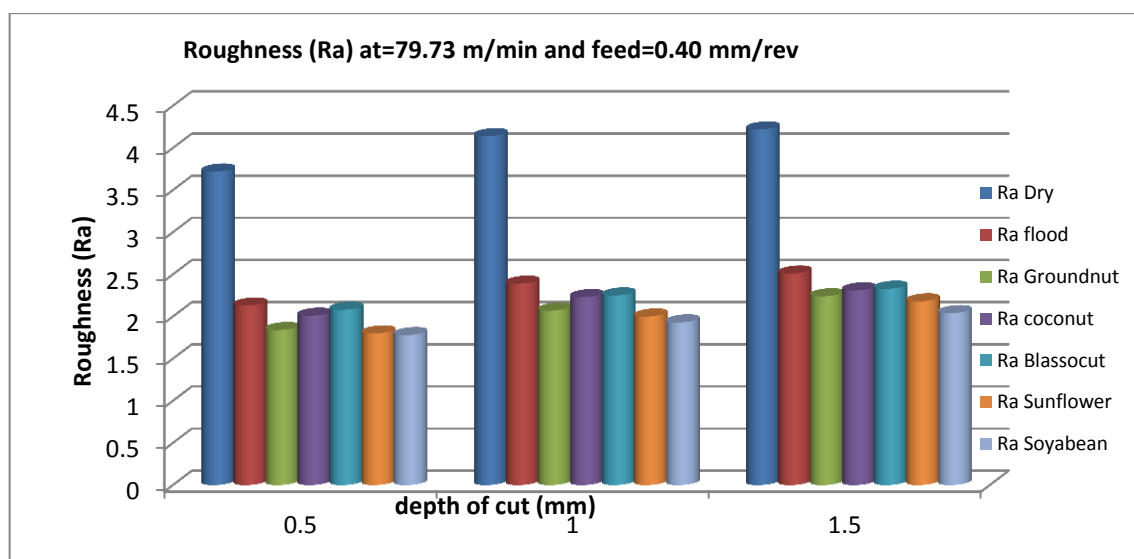
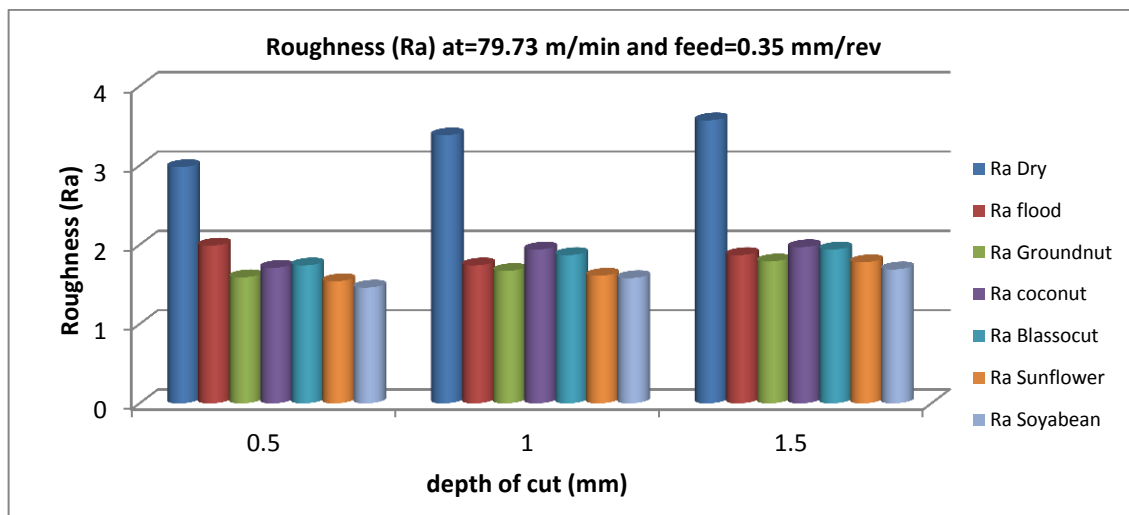
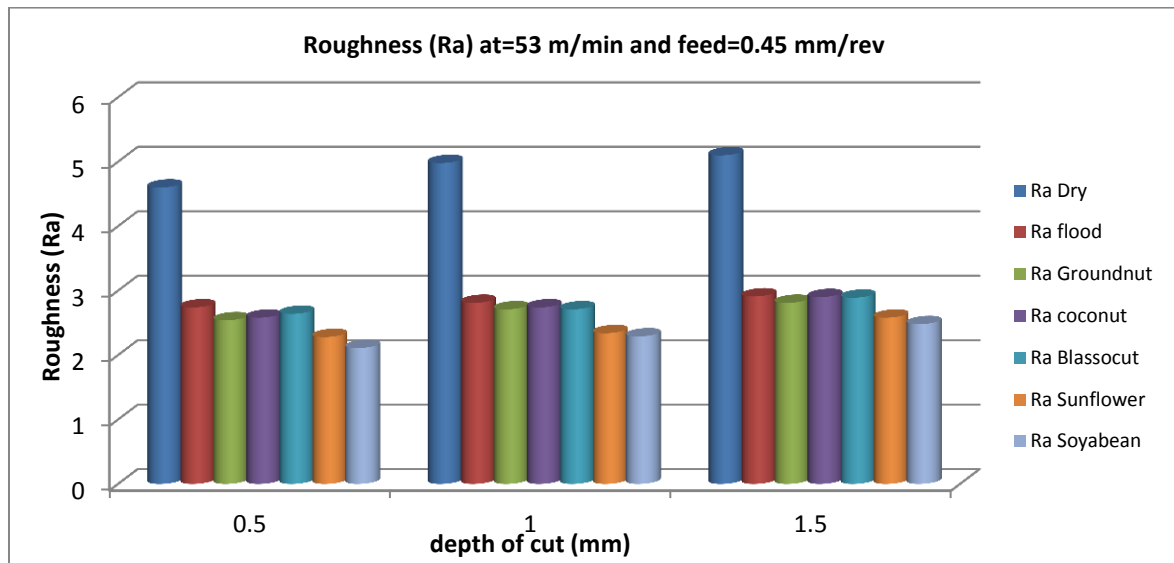


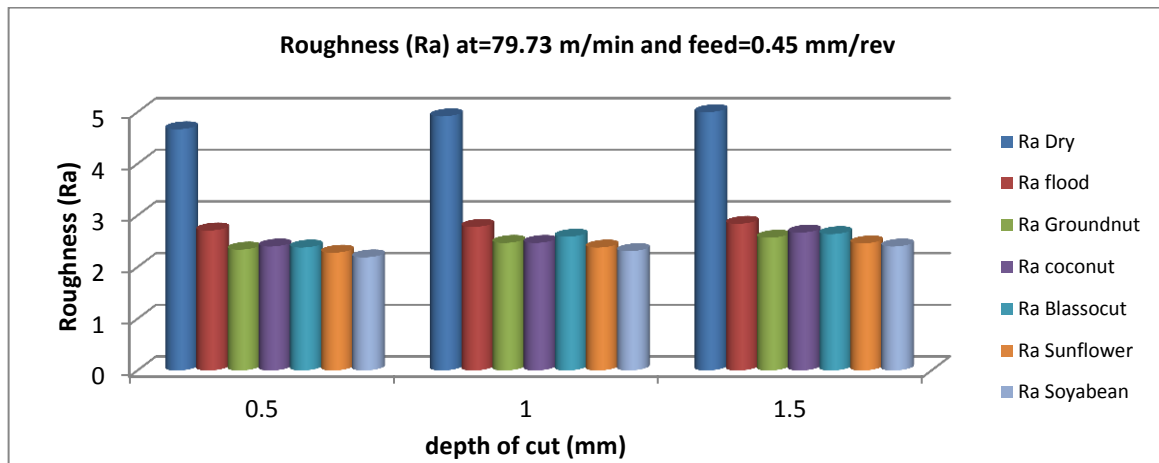


Graph 2: Variation of surface roughness (Ra), at different velocity 34.27,53,79.23 mm/min at different depth of cut and different feed rate at 0.35,0.40,0.45 mm/rev in dry, flood and MQL.

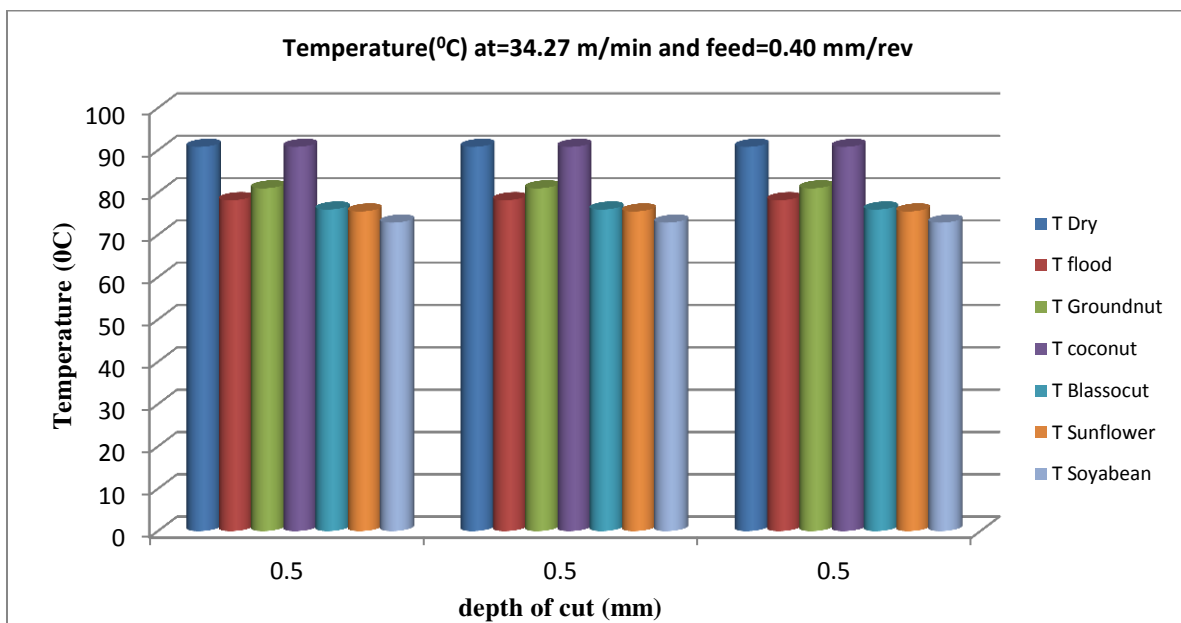
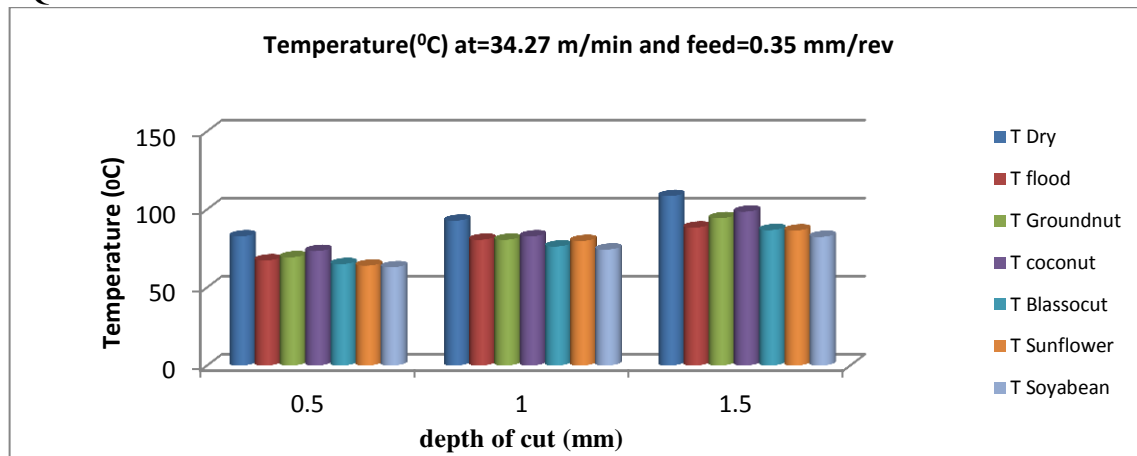


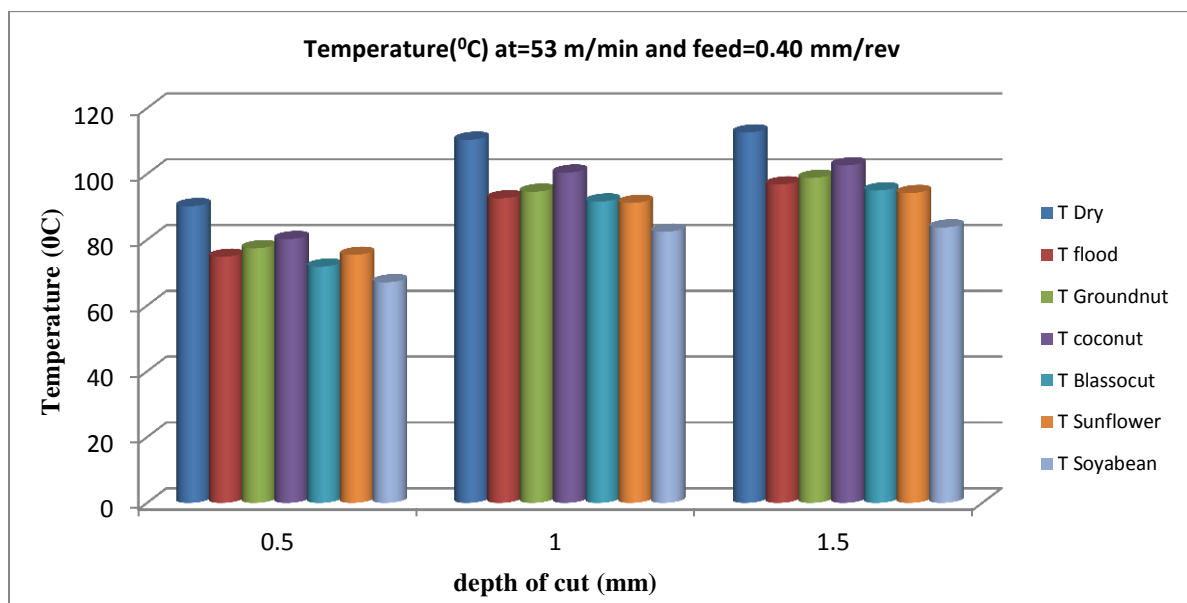
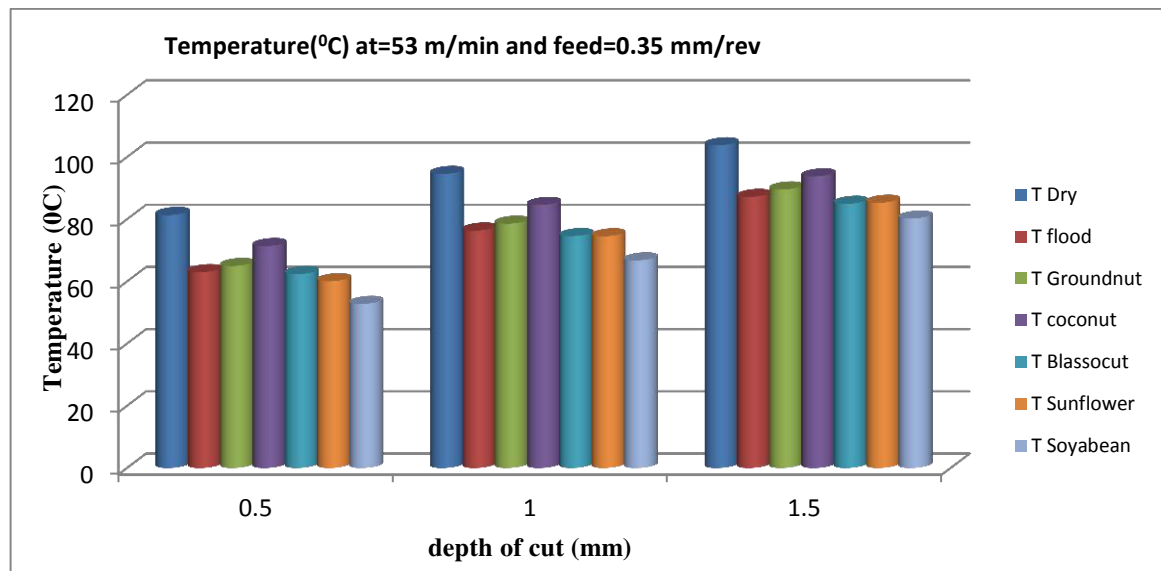
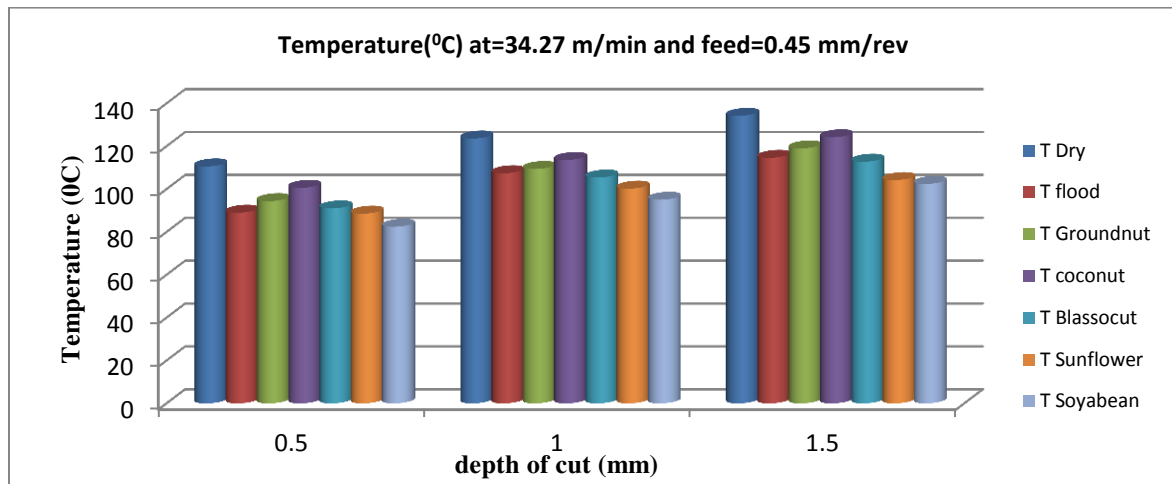


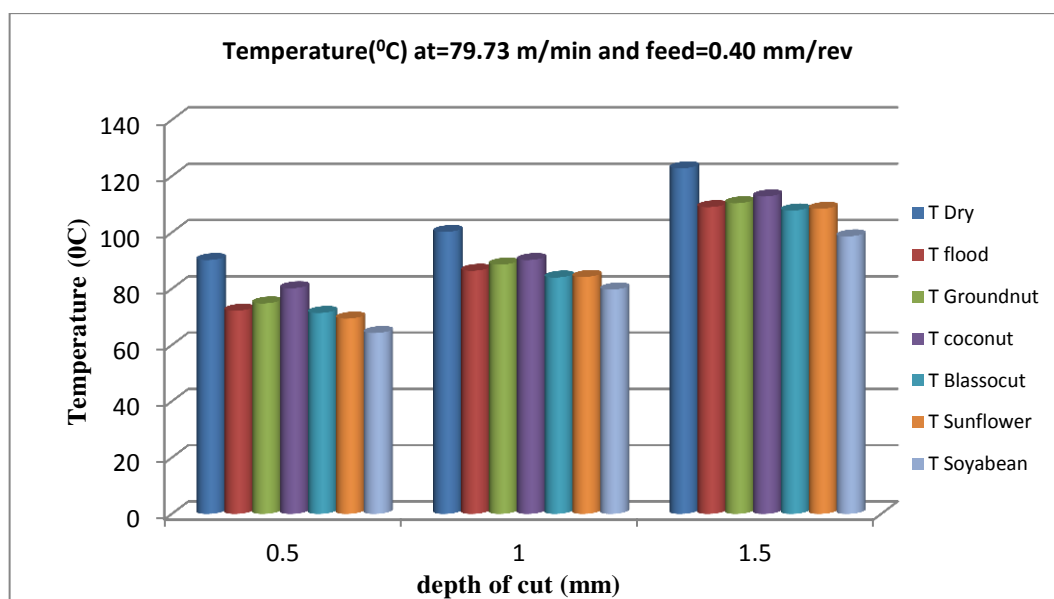
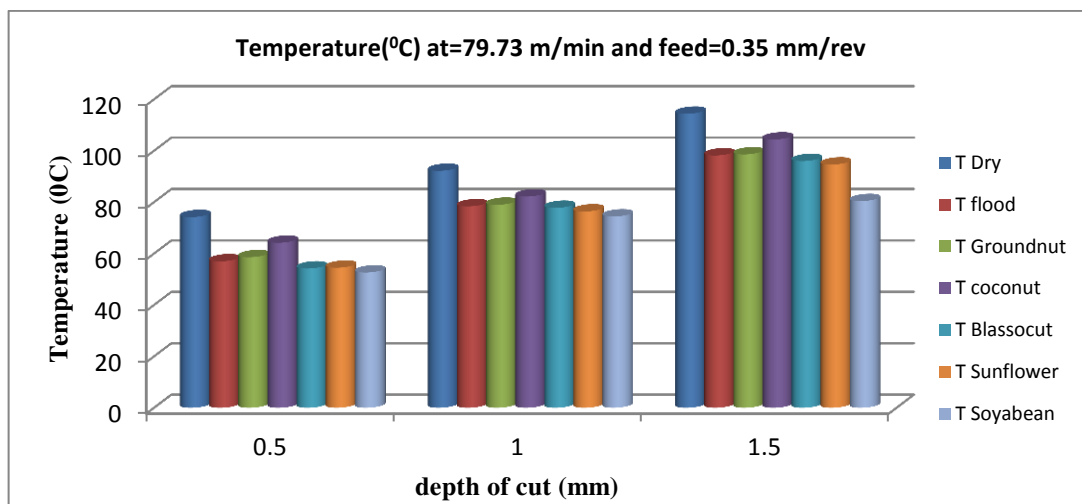
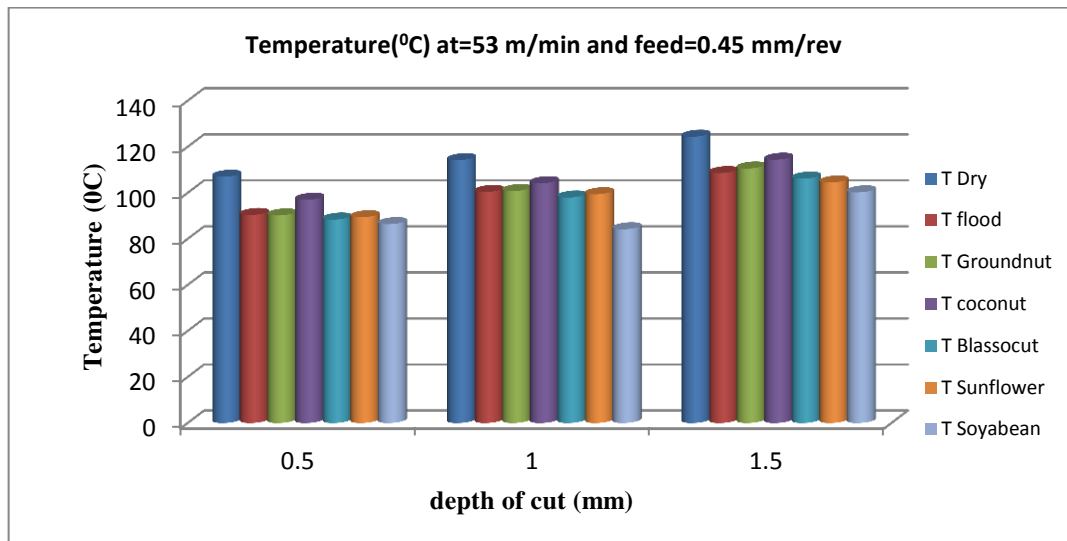


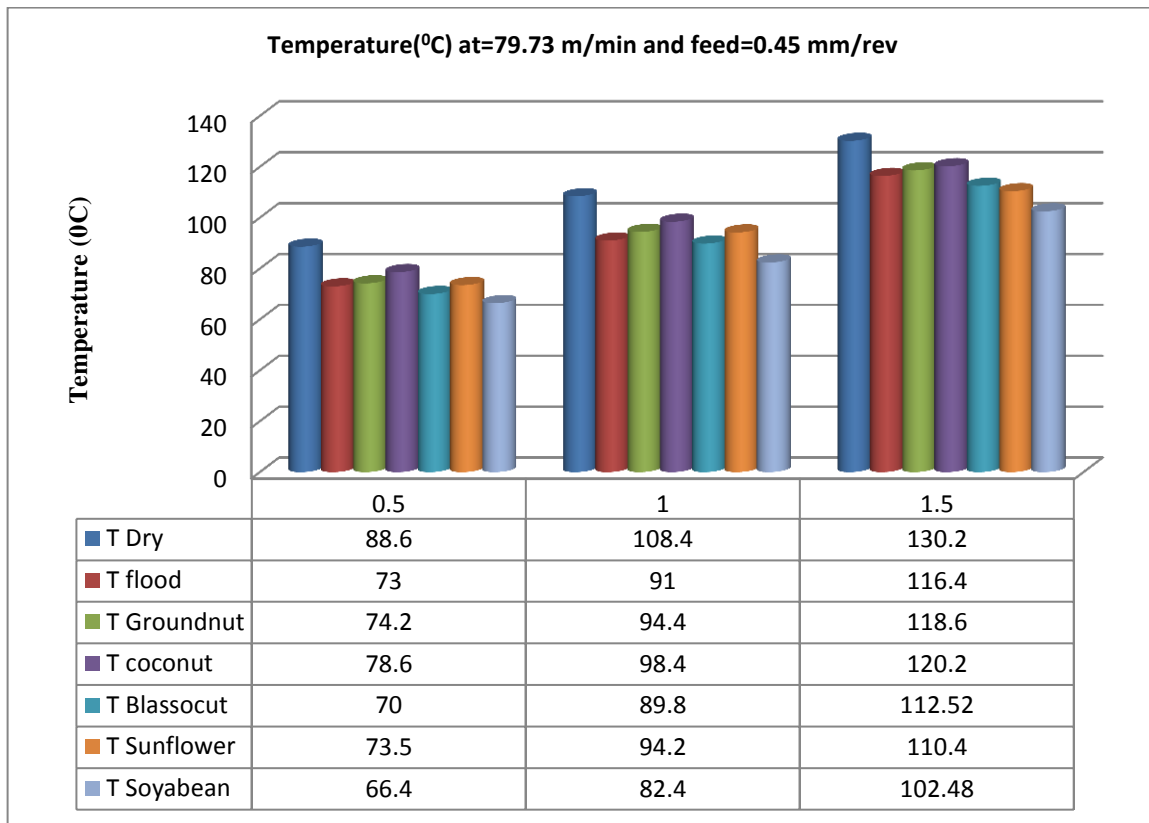


Graph 3: Variation of temprature ($^{\circ}\text{C}$), at different velocity 34.27,53,79.23 mm/min at different depth of cut and different feed rate at 0.35,0.40,0.45 mm/rev in dry, flood and MQL .









5. CONCLUSION

In this experimental study, performance evaluation of dry turning, wet turning and MQL turning is carried out in terms of cutting force for different combination and variation of cutting speed and depth of cut. From above experimental study following conclusions are revealed.

- I. Depth of cut is the most significant factor influencing the cutting forces. Feed rate also shows influence on cutting force. Cutting speed has less significant influence on the cutting force. From the above it can be concluded that the most effective method of force control is to change the depth of cut and feed for dry turning, wet turning and MQL turning.
- II. Cutting speed is most significant factor that influence on surface roughness followed by feed rate and depth of cut. At higher speed better surface finish is achieved in all type of cutting environments.
- III. Optimum values cutting parameters for minimum cutting forces surface roughness and temperature can be achieved by selecting relatively higher values of speed, lower values of depth of cut and feed rate for dry turning, wet turning and MQL turning.
- IV. Cutting forces surface roughness and temperature values for MQL turning are less than that of the wet turning and dry turning.
- V. Turning with MQL is a good alternative for conventional lubrication and dry turning if cutting forces surface roughness and temperature are considered as optimising parameter.

Future research will be performed in area of optimization of cutting parameter and surface roughness for dry turning, wet turning and MQL turning for minimum cutting forces by various optimization techniques

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Impact Of Consumers Towards Green Products - An Empirical Analysis

Paper ID	IJIFR/V3/ E10/ 049	Page No.	3846-3855	Subject Area	Commerce
KeyWords	Green Consumers, Green Products, Consumer's Attitudes & Behaviours				

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Abstract

Consumers are becoming more interested in environmentally friendly products, raising the demand against a limited supply. The limited supply may be associated to the lack of clear understanding among Coimbatore marketers on consumer's attitudes and behaviours towards this emerging phenomenon. The success of producing eco-friendly products will depend on whether consumers will accept the products or not. Hence the study focused to examine the impact of consumers towards green products.

1. INTRODUCTION

In the present day world, Marketing Strategies have gained greater social significance. For the modern marketer, green marketing has become the matter of prime importance. The concept of green was neither prominent in the late 1980's nor was the concept of green marketing / consumerism globally popular till 1990's. Environmental deterioration and global problems have together paved the way for the emergence of green marketing. In the business world, the companies are using the concept of green marketing for profit and the outcome of green policies is due to social responsibility.

2. OBJECTIVES

1. To study the consumer awareness and attitude towards green products.
2. To study the consumer pro-environmental behaviour towards green products.
3. To study the consumer buying behaviour and level of satisfaction towards green products.
4. To study the consumer impact towards buying green products.

3. METHODOLOGY OF THE STUDY

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3846

- **Period of the study:** The study conducted for a period 5 months from December 2015 - April 2016.

Sources of data: To accomplish the objectives of the study, the researchers have depended on both primary data and secondary data.

- **Primary data:** The study is based on primary data that were collected through a questionnaire.
- **Secondary data:** It was taken from published journals, magazines and from internet.
- **Sample technique:** The research was carried out in and around Coimbatore city. Stratified Random sample method was used to select the sample.
- **Sample size:** Sample size considered for the study was 500 respondents.
- **Tools used for analysis:** Multiple Regression Analysis

4. DATA ANALYSIS

Respondents Impact towards Buying Green Products - Multiple Regression Analysis

Multiple regression co-efficient measures separately the relationship between two variables in such a way that the effects of other related variables are eliminated. In other words, it measures the relation between a dependent variable and a particular independent variable by holding all other variables constant. Thus, each multiple regression co-efficient measures the effect of its independent variable on the dependent variable. Multiple regression analysis of impact of buying green products (Y) was performed with variables and Awareness about the green products (X_1), pro-environmental concerns (X_2), Respondents attitudes (X_3), Respondents Buying Behaviour (X_4), level of satisfaction (X_5) the following the multiple regression analysis model was used for this study as mostly found the extent literature is represented by

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon \quad (1)$$

$$Y (\text{ImpaBuGre}) = \beta_1 \text{RespAwarGre} + \beta_2 \text{RespProEnvirCon} + \beta_3 \text{RespAttitu} + \beta_4 \text{RespBuBeh} + \beta_5 \text{RespLevSatisGr} + \epsilon \quad (2)$$

Where, Y = Dependent variable - Impact on buying green product

Independent variable

AwarGre = Respondents Awareness towards green products,
ProEnvirCon = Respondents Pro-environmental concern towards green products,
RespAttitu = Respondents attitude towards green products,
RespBuBeh = Respondents Buying Behaviour towards green products
LevSatisGr = Respondents Level of satisfaction towards green products
 α = Intercept, β_1 β_5 = Estimated Coefficients, ϵ = Error term

The co-efficient of the explanatory and controllable variable (β_1 β_5) can be estimated by the use of the multiple regression through linear regression with stepwise method. Hence the purchase decision and their Impact towards purchase of green product are found to have significant influence on the Respondents Awareness towards green products, Respondents Pro-environmental concern towards green products, Respondents attitude towards green products, Respondents Buying Behaviour towards green products and Respondents level of satisfaction towards green products were intercepted using regression model.

Hypothesis (H₀): There is no significant difference between the impact of buying green products and selected dependent variables.

Table - 1: Correlation between selected variables with Factors related to Impact on Buying Green Products

S.No.	Factors		1	2	3	4	5
	(constant)	1.000					
1	Respondents awareness towards green products	.248**	1.000				
2	Respondents Pro-environmental concern towards green products	.299**	.279**	1.000			
3	Respondents attitude towards green products	.294**	.178**	.341**	1.000		
4	Respondents Buying Behaviour towards green products	.405**	.287**	.518**	.492**	1.000	
5	Respondents Level of satisfaction towards green products	.574**	.394**	.465**	.306**	.433**	1.000

Source: Primary Data

**p <0.01, *p<0.05

The above table reveals the correlation analysis done on all the data that has been collected through the survey. This analysis is done to show the existing relation among the study variables namely respondent's awareness towards green products, respondent's pro-environmental concern towards green products, respondent's attitude towards green products, respondents buying behaviour towards green products and respondents level of satisfaction towards green products. It can be seen that variable namely X₁ (Respondents awareness towards green products, r=0.248, P<0.01), X₂ (Respondents Pro-environmental concern towards green products, r=0.299, P<0.01), X₃ (Respondents attitude towards green products, r=0.294, P<0.01), X₄ (Respondents buying behaviour towards green products, r=0.405, P<0.01) and (Respondents level of satisfaction towards green products, r=0.574, P<0.01) have significant positive correlation that have impact on buying green products among consumers. Hence, all the predictor variables were entered simultaneously and the predictor variables were used based on enter method.

Table - 2 : Multiple Regression Analysis of the selected variables with Factors related to Impact on Buying Green Products

S.No.	Factors	Standardized Coefficients (β)	t-value	p-value	S/NS
	(constant)	15.694	9.163	.000**	S
1	Respondents awareness towards green products	.006	.045	.964	NS
2	Respondents Pro-environmental concern towards green products	-.042	-1.138	.256	NS
3	Respondents attitude towards green products	.044	1.696	.091	S
4	Respondents Buying Behaviour towards green products	.084	3.869	.000**	NS
5	Respondents Level of satisfaction towards green products	.441	11.356	.000**	S
	R	0.729			
	R²	0.537			
	Sample size (N)	500			

Source: Primary Data **p <0.01, *p<0.05 S-Significant NS- Not significant

In table – 2 the Adjusted R Square value tells us that our model accounts for 53.7 per cent of variance - a good model and the Standardized Beta Coefficients give a measure of the contribution of each variable to the model. A large value indicates that a unit change in this predictor variable has a large effect on the criterion variable. The t and Sig (p) values give a rough indication of the impact of each predictor variable namely, respondents Buying Behaviour towards green products (t=3.869, p< 0.01) and respondents level of satisfaction towards green products (t=11.356, p< 0.01). It found that p value suggests that a predictor variable is having a large impact on the criterion variable.

Table - 3: ANOVA between selected variables with Factors related to Impact on Buying Green Products

Model	Sum of Squares	df	Mean Square	F-value	p-value	S/NS
Regression	4063.920	5	812.784	56.735	.000**	S
Residual	7077.062	494	14.326			
Total	11140.982	499				

Source: Primary Data **p <0.01, S-Significant

Hence, from the table 3 Overall ANOVA results, which assesses the overall significance of this model (F=56.735, p value=0.00). Hence, it is concluded that this model is statistically significant.

5. CONCLUSION

Even though the influence towards purchase decision and their Impact towards purchase of green product were found to have less significant towards awareness, attitude, pro-environmental concerns, etc. It is clear that there is high significant influence among respondents towards Buying Behaviour and level of satisfaction and had significant impact towards purchase of green products.

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Improving Speech Intelligibility of Sensorineural Hearing Impaired and Real Time Noise Cancellation Using Filters

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Abstract

Sensorineural Hearing Impaired diseases is coupled with widening of audial filters, redoubled spectral masking and ruined auditory perception. Within the rural sector of India there's an oversized variety of hearing impaired persons. The hearing aids that area unit supported speech process for biaural dichotic presentation will decrease the impact of spectral masking and might facilitate in rising auditory perception of the one who is plagued by Sensorineural hearing disorder. it's calculable that as several as five hundredth of youngsters underneath the age of seven have temporary hearing disorder, this have an effect on their academic and social progress. Hearing impaired persons, particularly those with moderate or severe hearing disorder, suffer from diminished opportunities for oral communication. The traditional analog hearing aids area unit having variety of useful shortages. To beat these issues we have a tendency to develop a DSP based mostly programmable digital hearing aid.

1. INTRODUCTION

Hearing impairment may be classified, on the idea of location of the defect within the sensory system, as conductive, sensorineural, and central losses (mixed). Conductive loss happens attributable to associate degree abnormality within the tympanum resulting in poor transmission of the sound to the internal ear. Sensorineural loss is caused by pathology within the tube-shaped structure and/or attributable to degeneration of the modality nerves. Central loss happens attributable to inability of the brain in cryptography the neural firings into purposeful linguistic data. Out of those 3 losses the foremost severe one is sensorineural loss that can't be surgically treated and thence is that the prime focus of this work. The characteristics of sensorineural deafness that happens attributable to the harm of hair cells within the tube-shaped structure or degeneration of eighth cranial nerve fiber. The sensorineural hearing impairments exhibits increase in thresholds of hearing, reduction in dynamic vary of hearing, degradation of temporal resolution, increase in temporal masking and degraded frequency property attributable to increase in spectral masking. The essential plan is reduction within the spectral masking to extend the comprehensibility of the speech signals.

The peripheral sensory system of the human ear behaves sort of a bank of band pass filters known as modality filters or crucial bands. Reduction in spectral contrasts ends up in broadening of modality filters. The peaks and valleys of the sound spectrum square measure broadened poignant the perception of speech as a result of masking. Enhanced temporal masking ends up in the rise of forward and backward masking of weak acoustic segments by sturdy ones that conjointly affects intelligibility. Sound perception at higher modality levels involves the mixing of knowledge received from each the ears.

In general, sensorineural loss is troublesome to cure and it becomes increasingly worse with time. Sensorineural deafness is related to widening of the modality filter bandwidths therefore the filter slope becomes shallower and ends up in overlap of adjacent spectral bands known as spectral masking. This ends up in a decrease in frequency breakdown capability of the sensory system of the ears. From completely different completely different investigations it had been detected that cacophonic the speech into different bands and presenting the alternate bands to every ear as shown was advantageous for folks with moderate bilateral sensorineural impairment, with residual hearing in each ears. Cacophonic of speech into signals, such the frequency elements that square measure possible to urge covert square measure separated and conferred to completely different ears has helped in reducing the result of spectral masking. the data from the signals conferred to the 2 ears gets integrated at higher levels within the modality method.

Traditionally Digital signal process Algorithms square measure developed mistreatment signal process chip (DSP chip) for lower rate applications. For higher rate, Application Specific Integrated Circuits (ASIC) square measure accustomed method the \$64000 sign. the arrival of FPGAs created a replacement era for DSP engineers. Together with low price, it provides higher practicality in terms of speed and power consumption. System style cycle time conjointly shrinks with great deal once FPGA is employed to method the

\$64000 sign like audio, video and image. Investigations reportable showed that comb filters supported modality crucial bandwidths, with magnitude responses designed for sensory activity balance of loudness and linear part responses, resulted during a vital improvement in sound perception. Many investigations involving implementations of signal process applications with extremely parallel computations have reportable FPGAs to be higher suited than DSP chips. The DSP-chip based mostly process involves serial instruction fetch-and execute cycles. As a result of power and house constraints, hearing aids square measure typically designed mistreatment ASIC (application specific integrated circuit), that involves vital nonrecurring price associated with chip fabrication. It provides flexibility.

Speech sweetening aims to enhance speech quality by mistreatment numerous algorithms. It should sound easy, however what's meant by the word quality. It may be a minimum of clarity and comprehensibility, pleasantness, or compatibility with another methodology in speech process. Wiener filter square measure rather easy and viable, however once the estimation of the ground noise, one neglects the actual fact that the signal is truly speech. moreover, the part of the signal is left untouched. However, this can be maybe not such a foul problem; on balance, human ear isn't terribly sensitive to part changes. The third restriction in spectral subtraction ways is that the process of the speech signal in frames, therefore the continuing from one frame to a different should be handled with care to avoid discontinuities. Noise reduction could be a key-point of speech sweetening systems in hands-free communications. In this, we have a tendency to propose a method supported a Wiener filtering below uncertainty of signal presence within the uproarious observation.

The objective of labor is to separate speech signal into 2 complementary components by planning FIR Comb filter in C language with the assistance of DSP processor. The theme was found useful in rising sound perception .To test the filters we tend to given completely different syllables and check the response of subjects for processed and unprocessed signals .If the responses square measure higher for processed sound which means filters square measure operating properly. The FIR Comb filters square measure enforced victimization TMS320CX DSK. Filter coefficients for all pass filters square measure calculated and that any convolved with input speech signals. Then this processed and unprocessed signals square measure given to subject's dichotically and responses from the themes square measure compared with the assistance of confusion matrix.

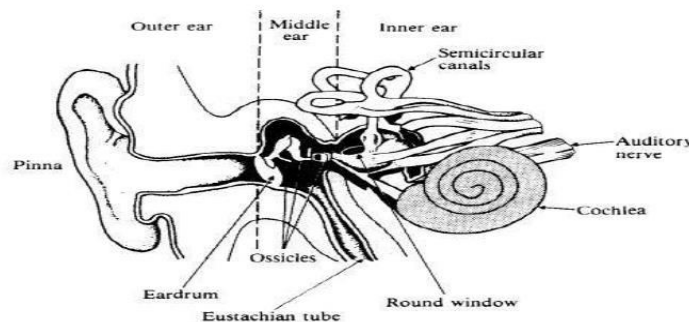


Figure 1: Internal Structure of Human Ear

Fig.1. shows the interior structure of human ear. The human ear has 3 main components i.e. external organ, the center ear and therefore the inner ear. The external organ is that the half that may be seen and includes the meatus. The center ear contains of the tissue layer (tympanic membrane), the connexion of 3 bones (ossicles) of the center ear, and therefore the salpinx. The salpinx provides indications to the throat and helps equalize pressure within the bodily cavity. Within the internal ear there are unit components just like the tube-shaped structure and therefore the semi-circular canals. The tube-shaped structure feels like a snail shell. There are unit sensory cells (hair cells) within the tube-shaped structure that reply to sound and send nerve signals to the brain. The semicircular canals area unit most popular because the balance organ.

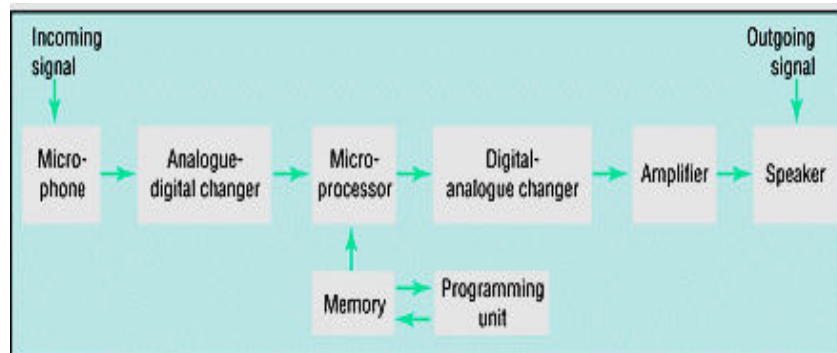


Figure 2: Structure of Digital Hearing Aid

Fig.2. shows the structure of digital hearing aid that processes the speech in same manner as that of ear. In digital hearing aid mike receives the signal from outside world and directs towards the center ear. Tympanic cavity acts as Associate in Nursing electrical resistance matching network as that of electronic equipment.

Sensorineural deafness happens once there's destruction to the cranial nerve or hair cells within the inner ear. This injury may be the results of eruption, injury, infection, a genetic condition or aging. Some deafness will typically be corrected by surgery, sensorineural deafness cannot. Sensorineural deafness is often supplemented by reduced frequency property and temporal resolution. The decrease in frequency property causes disadvantages through masking, principally masking of middle and high frequency parts by intense low frequency components: the questionable spectral masking. to scale back masking between adjacent frequency bands, we tend to propose dichotic listening, during which frequency bands are fragmented into complementary elements and conferred dichotically.

2. CAUSES OF HEARING DISABILITIES

Hearing loss are often the results of several various causes, every having a various result on one's ability to listen to. The foremost common sort of hearing disorder is expounded to the advanced people and therefore the growing result of continuous exposure to sound energy. Basically, there square measure following kinds of hearing impairment:

Conductive hearing loss Causes:

- By Birth defects
- Middle ear infections
- Head injury

- I. Sensorineural hearing loss Causes:
 - Normal aging process
 - Head injury
- II. Neural hearing loss Causes:
 - Genetics
 - Head injury
 - Cancer
- III. Mixed hearing loss Causes:
 - Mixture of conductive and sensory causes

3. TYPES OF HEARING AID

There are different types of hearing aid as follow,

- i.) Completely in The Canal-CIC
- ii.) Inside The Canal- ITC
- iii.) Inside The Ear- ITE
- iv.) Behind The Ear- BTE

Problems faced by people with hearing impairment-

I. Decreased Audibility:

Some sound cannot be heard by hearing impaired individuals. In some cases they will feel the speech is loud enough however it's not adequately clear. This attenuated perceptibility is as a result of magnified Hearing Threshold. Hearing Threshold could be an explicit sound level on top of that a patient will hear at that frequency while not the employment a hearing aid

II. Decreased Dynamic Range

There is a sound level which may be detected simply by someone. Uncomfortable Loudness Level (ULL) at a selected frequency is that the soundest level the patient will hear simply at that frequency. The variation between the ULL and therefore the hearing threshold is thought because the dynamic vary. In sensorineural deafness threshold and ULL will increase. The dynamic vary of hearing impaired are going to be less as compared to it of a traditional ear.

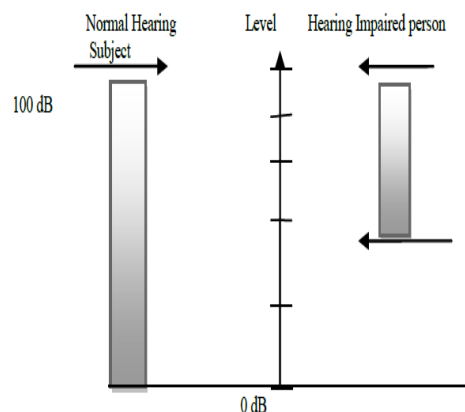


Figure 3:.Dynamic Range and Audibility

III. Decreased Frequency Resolution

There is minimized frequency resolution in sensorineural hearing impairment. It's caused by broken tube-shaped structure. If the frequency resolution is sufficiently less than the extraordinary low frequency elements of speech might mask weaker high frequency parts. This can be stated as upward unfold of masking.

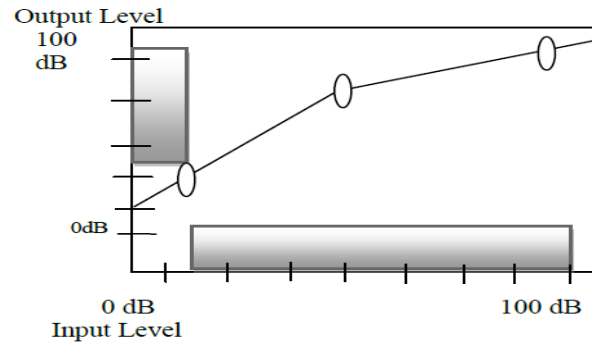


Figure 4: Dynamic Range Compression

IV. Decreased temporal Resolution

Intense sounds will mask weaker sounds that in a flash come initial or now follow them. This kind of masking is additional dominant for individuals with sensorineural hearing disorder. This adversely affects intelligibility.

V. Signal to noise ratio(SNR)

In noisy environment hearing impaired person requires large SNR especially for speech recognition.

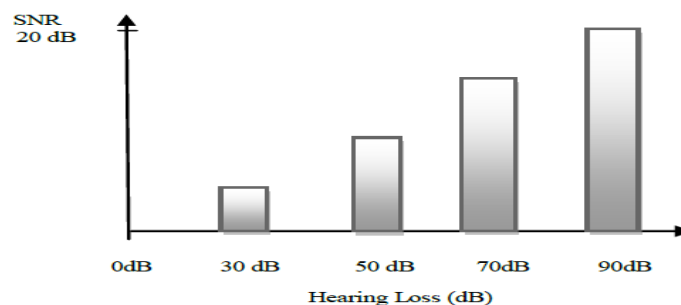


Figure 5: SNR Vs Hearing Loss

4. LIMITATIONS OF CONVENTIONAL ANALOG HEARING AIDS

In the past, conventional analog hearing aids were the only choice available to the hearing impaired. They have the following drawbacks:

- Typical analog hearing aids offer an equivalent amplification to any or all frequencies. The hearing disorder might take issue for various frequencies. Thus associate degree aid which will offer a variable gain with regard to frequency is required.
- In analog circuits, we tend to cannot program the help that puts serious limitation on the planning. in this it's just about not possible to line the hearing aid characteristics to suit a specific user's hearing profile.
- Amplification of all audio signals raises the sound levels of high intensity signals and produces high values leading to discomfort for the user. These necessitate a hearing aid which will alter its gain in accordance with the intensity of sound signals
- The user is unable to know the speech signals within the presence of ground noise

- e) A strictly analog approach lacks the flexibleness and is tough to interface with information analyzers like computers.

5. MAINTAINING THE INTEGRITY OF THE SPECIFICATIONS

Most of the researchers contributed in rising the comb filters supported sensory system vital bands to regulate the magnitude response at the transition, crossovers for minimizing the received spectral distortion, pass band ripples and increase the stop band distortion. In 1997, Chaudhari projected technique for real time process by coming up with comb filter exploitation 256 constant, taking into concern the current developments in DSP processors, in contrast to earlier that was 128 constant, the transition dimension became [*fr1] from seventy eight rate to thirty-nine rate with rate ten k Sa/s, pass band ripple of three dB, stop band attenuation of eleven dB and inter-band crossovers from 0-10 dB. This helps enter correct separation. However the variation in intensity is detected once curving tone was processed exploitation this try of filters. This such a necessity for coming up with filters that have low pass band ripple, high stop band attenuation and band transitions with gains adjusted for sensory activity balance of intensity.

the primary step towards coming up with higher filters, comb filters should be designed with the sharp transition band. By doubling the filter constant the transition dimension became [*fr1] however it failed to lead to vital improvement in pass band ripple and stop band attenuation. But filter with comparatively little stop band attenuation could give inadequate separation between bands.

Alice N. Cheeran, Prem C. Pandey, and Dakshayani S. Jangamashetti reported that, comb filters supported sensory system filter bandwidths helps in reducing the result of spectral masking that is expounded to sensorineural disability..

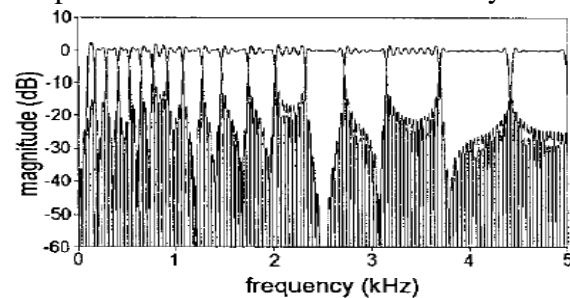


Figure 6: Magnitude response of pair of comb filters with sharp transition between bands

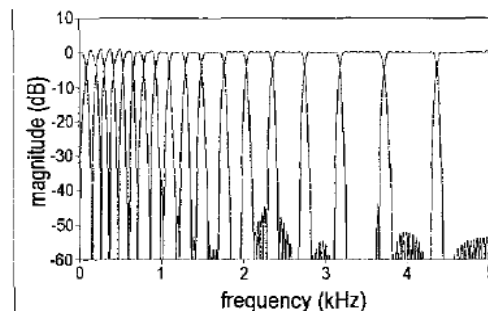


Figure 7: Magnitude response of the pair of perceptually balanced comb filters

6. DIFFERENT TYPES OF FILTERS

6.1. Adaptive Wiener filter

Wiener filter theory delivers an acceptable technique of mathematically analyzing applied math noise cancelling issues. The Wiener filter may be a widespread technique that has been utilized in several signal improvement strategies. The fundamental principle of the Wiener filter is to get speech signal from that corrupted by additive noise. This estimation is obtained by minimizing the Mean sq. Error (MSE) between the required signal $s(n)$ and also the expected signal $\hat{s}(n)$. It's supported a method. The Wiener filter weights screeching signal spectrum in step with SNR at totally different frequencies.

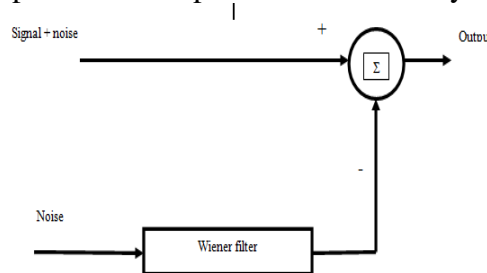


Figure 8: Basic of Wiener Filter

Usually filters square measure designed for a desired frequency response. However, the look of wiener filter takes a unique approach. One is meant to own information of the spectral properties of the initial signal and therefore the noise and one rummage around for the linear time invariant filter. Linear time invariant filter whose output would come back as near the initial signal as doable.

The transfer performs in frequency domain of wiener filter is expressed as follows:

$$H(\omega) = \frac{Ps(\omega)}{Ps(\omega) + Pd(\omega)} \quad (1)$$

Where, $Ps(\omega)$ and $Pd(\omega)$ are power spectral densities of clean and noisy speech signals respectively.

In wiener filter, the speech signal and noise is assumed uncorrelated and stationary, and the SNR is given by:

$$SNR = \frac{Ps(\omega)}{Pd(\omega)} \quad (2)$$

Using this definition of SNR, the transfer function of Wiener filter can be given:

$$H(\omega) = \left[1 + \frac{1}{SNR} \right]^{-1} \quad (3)$$

From the above definition of transfer function, it can be interpreted that the Wiener filter has fixed frequency response at all frequencies. It also needs an approximation of the power spectral density of clean signal and noise earlier to filtering.

6.2 Comb Filter

Comb filter is a Finite Impulse Response (FIR) filter. It is also digital low pass filter. The output of the differentiator is the difference between the present input and the past input is represented in the time domain representation

$$H(z) = \frac{Y(z)}{X(z)} = (1 - z^{-1}) \quad (4)$$

$$H_{comb}(z) = 1 - z^{-MD} \quad (5)$$

In this equation, D is a design parameter used to control the filter's frequency response. D can be any positive integer, but it is usually limited to 1 or 2. The corresponding transfer at f_s . When $M = 1$ and $D = 1$, the power response is a high-pass function with 20 dB per decade gain. When $MD \neq 1$, then the power response takes on the familiar raised cosine form with MD cycles from 0 to 2π . The transfer function is converted into the frequency response.

$$|H(f)| = \sqrt{2(1 - \cos(2\pi \frac{f}{f_s}))} \quad (6)$$

The final output of the decimator which is the output of the differentiator circuit has to be in binary form for further signaling processing. So the two's complement output is converted back to the binary form. The differentiator operates at a different clock frequency compared to the clock frequency of the integrator.

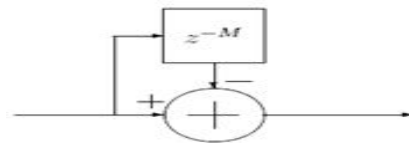


Figure 9: The Basic Comb Filter

7. RESULTS

A. Simulation Results

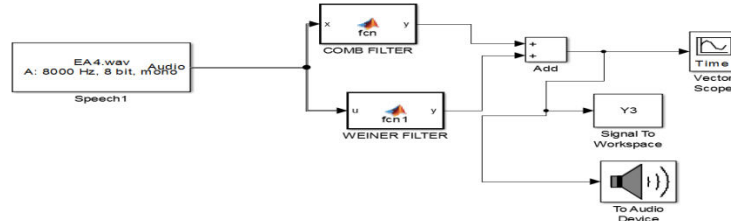


Figure 10: Simulink Model

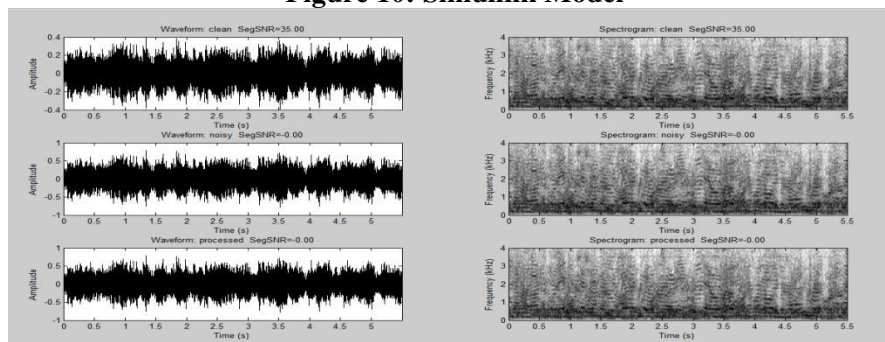


Figure 11: Time Domain Waveforms And Spectrogram Of Clean Signal, Noisy Signal And Processed Signal

8. CONCLUSION

The main purpose of this paper is to develop a digital signal process platform for Digital Hearing Aid device for Sensorineural Hearing aid persons. It delivers an inspiration regarding however a Digital hearing aid is often custom to fulfill the patient demand. Some complicated speech process algorithms like dynamic vary compression and feedback cancellation with adaptive Filtering approach is deliberated. Implementation of hearing aid by mistreatment wiener and comb filter can cut back dynamic vary and frequency selective response. Magnitude responses designed are designed for sensory activity balance of loudness. Linear section response is beneficial in up sound perception. Adjustable filters are adjusted till the error between the filter output and desired signal is decreased. By mistreatment wiener filter mean sq. error is reduced and stability of system is exaggerated. A combine of comb filters with magnitude responses thought of for sensory activity balance of loudness and linear section responses may be helpful in up sound perception with moderate bilateral sensorineural loss.

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Secure Image Transmission Using Secret Fragment Visible Mosaic Image

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Abstract

A new secure image transmission technique that changes naturally a given large volume secret image into a secret-fragment-visible image referred to as mosaic image of an equivalent size. The mosaic image, that seems to be like associate degree discretionarily select target image and will be used as a disguise of the key image, is yielded by separating the key image into sections and dynamic their shading attributes to be those of the examination items of the target image. Skilful techniques square measure meant to guide the shading modification method so secret image could also be recuperated virtually lossless. A theme of handling overflows/underflows within the modified over pixels shading values by recording the shading distinction within the untransformed shading house is to boot projected. The information required for recuperating the key image is embedded into the created mosaic image by a lossless information concealing set up employing a key.

1. INTRODUCTION

Currently, pictures from totally different sources square measure used and transmitted through the online for various applications, as an example on-line personal photograph albums, confidential enterprise archives, restorative imaging framework, military image databases. These pictures typically contain non-public or confidential

knowledge so they got to be protected from leakages throughout transmissions. Recently various techniques are planned for secure image transmission, that 2 basic methodologies square measure image secret writing and knowledge concealment. Image secret writing could be a methodology that produces utilization of the characteristic property of a picture, like high redundancy and robust spatial correlation, to induce a disorganized image. The disorganized image could be a useless document, that can't offer further knowledge before unscrambling and will stir Associate in nursing assailant's attention throughout transmission owing to its irregularity in structure.

An alternate methodology to avoid this drawback is that the knowledge concealment that hides a secret message into image so nobody can notice the existence of the key image. However the most issue of information concealment is that if one needs to cover a secret image into a canopy image with an equivalent size, the key image should be exceptionally compacted previous time. but for several applications, like sending medical photos, legal documents, and military pictures and then on it contain guidance, in such cases knowledge compression operations ends up in a loss of necessary info.

2. Problem Statement

With the quick development of image transmission through laptop networks particularly the web, medical imaging and military message communication, the safety of digital pictures has become a most vital concern. Image transmission may be a difficult task as a result of it's quite totally different from text encoding owing to some intrinsic properties of pictures like Brobdingnagian knowledge capability and high redundancy, that area unit usually troublesome to handle by mistreatment standard techniques.

3. Proposed Technique

A new technique for secure image transmission that transforms a secret image into a big mosaic image with identical size and resembling a preselected target image. The transformation method is controlled by a secret key and solely with the key will someone recover the key image nearly lossless from the mosaic image. The mosaic image is that the results of arrangement of the fragments of a secret image in disguise of another image known as the target image that is preselected from the info.

A mosaic image is that the method of making photos or ornamental patterns by cementing along little items of stone, glass or different arduous materials of varied colors. Mosaic contains additional range of little pictures known as tile pictures. Mosaic image may be created by dividing the initial image into several tiles and for every tile, notice another image with similar content from picture info. Finally we've got to create the mosaic image by replacement all tiles by their similar pictures. Given secret image is 1st divided into rectangular fragments known as tile pictures that then are work into similar blocks within the target image, known as target blocks, in line with a similarity criterion supported color variations. Next, the colour characteristic of every tile image is remodelled to be that of the corresponding target block within the target image, leading to a mosaic image that

appears like the target image. Relevant schemes also are planned to conduct nearly lossless recovery of the initial secret image from the ensuing mosaic image. The planned technique is new therein a significant mosaic image is formed, in distinction with the image coding technique that solely creates unmeaning noise pictures. Also, this technique will remodel a secret image into a disguising mosaic image while not compression, whereas informational knowledge and information concealment technique should hide an extremely compressed version of the key image into cowl canopy image once the key image and therefore the cover image have identical data volume.

4. Existing Systems

4.1 Conventional Methods

In the image-processing applications, the traditional strategies that square measure most often used square measure cryptography, watermarking and steganography mistreatment Least- vital Bit (LSB) algorithmic program. Cryptography is that the technique during which encoding and coding square measure performed supported the key that is thought solely to the sender and receiver.

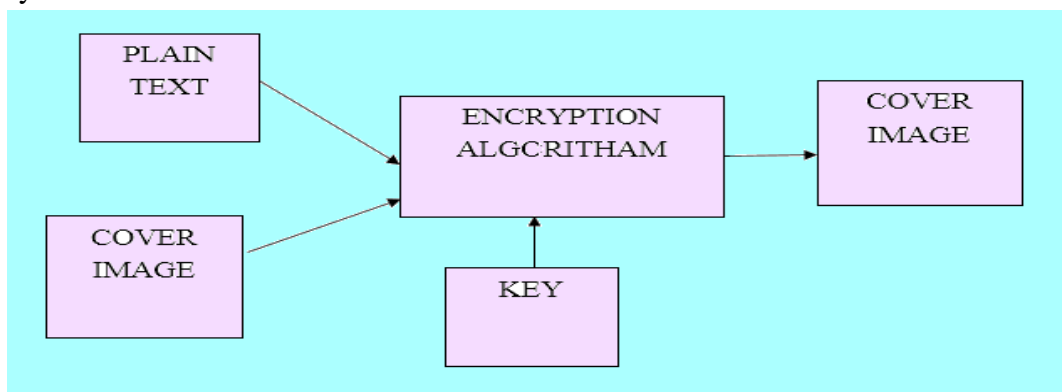


Figure 1: Encryption Process

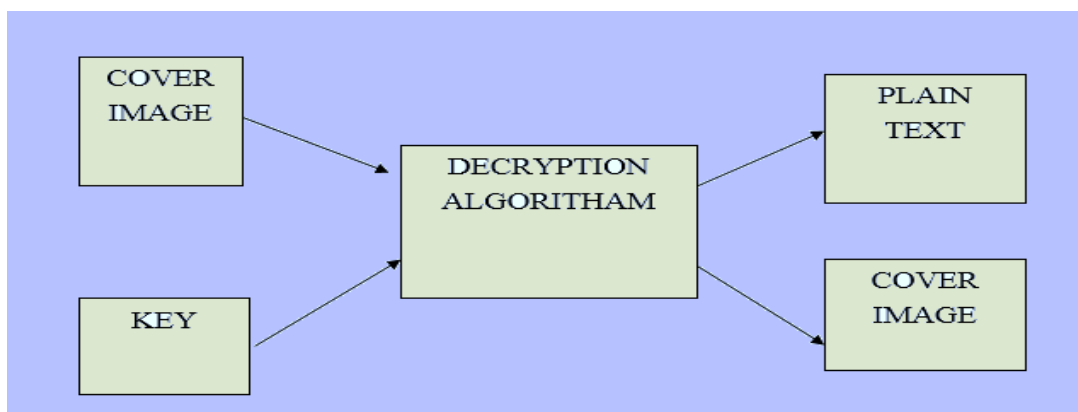


Figure 2: Decryption Process

The original info is embedded by following some encryption method within which the info is re-inserted supported sure procedure. So as to decrypt the message at the receiver, the reverse method is followed that is completed at the encryption method. The distinction between steganography and cryptography is that Cryptography is most well-liked to stay

the contents of the message on the Q.T. whereas steganography is that the technique that keeps the existence of the message secret. These 2 ways defend info from the unwanted parties and security attacks. The opposite technology that's closely associated with these ways is digital water-marking, within which a picture is embedded into the first image specified it helps in signifying the possession for the aim of copyright protection. Water-marking technique allows the property of the owner to spot the shoppers WHO break their contract by supply the property to 3rd parties. Figures represent the secret writing and decipherment processes in cryptography.

4.2 Image Encryption

The information security is used from old ages, different person using different technique to secure their data.

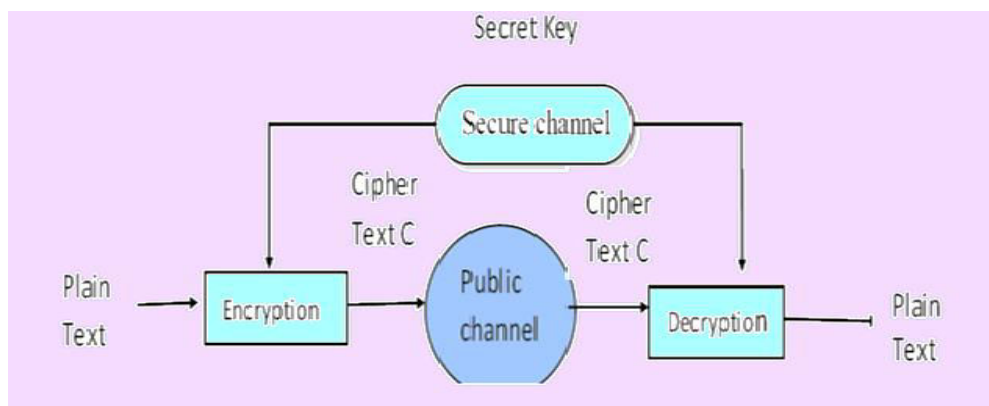


Figure 3: Symmetric key Cryptography

- Secret key cryptography: Secret key cryptography is also recognized as symmetric key cryptography. Through this type of cryptography, both the sender and the receiver know the same secret code, called the key. Messages are encrypted by the sender by means of the key and decrypted by the receiver using the identical key.
- Public key cryptography: Public key cryptography is also recognized as asymmetric key cryptography, uses a pair of keys for encryption and decryption. By means of public key cryptography, keys work in pairs of matched public and private keys.

Following are some techniques that uses for security of images from ancient age to till date. [35]

- i.) Steganography
- ii.) Water Marking Technique
- iii.) Visual Cryptography
- iv.) Without sharing Keys Techniques

1. Steganography

The steganography word comes from the Greek word Steganos, that is employed to hide or secret and a graphic is employed for writing or drawing. Therefore, steganography is, literally, coated writing. The most plan for covering the knowledge} or steganography is employed for secure communication in an exceedingly fully undetectable manner and to

avoid drawing suspicion to the transmission of a hidden data. throughout the transmission method, characteristics of those strategies square measure to alter within the structure and options therefore as to not be diagnosable by human eye. Digital videos, images, sound files, etc.

4.3 Water Marking Technique

Water Marking is additionally one in all the technique wont to hide the digital image, Digital watermarking could be a method of embedding (hiding) marks that area unit generally invisible which will be extracted solely by owners of the authentication. this can be the technology that is used] with the image that can't be victimized by the other unauthorized miss users. This technology permits anyone to try and do with none distortion and keeping far better quality of stegno image, conjointly in an exceedingly secured and reliable manner guaranteeing economical and retrievals of secret file. Digital watermarking finds wide application in security, authentication, copyright protection and every one walks of web applications. There has been effective growth in developing techniques to discourage the unauthorized duplication of applications and knowledge. The watermarking technique is one, that is possible and style to safeguard the applications and knowledge connected. The term,, cover,, is employed to explain the first message during which it'll hide our secret message, record or image file. Invisible watermarking and visual watermarking is a unit for vital kinds of top aforementioned technology. The most objective of this package is to scale back the unauthorized duplication of applications and knowledge, offer copyright protections, security, and authentication, to all or any walks of web applications.

5. PROPOSED METHOD

The proposed method includes two main phases as shown by the block diagram of Fig. 3.4

- i.) Mosaic image creation
- ii.) Secret image recovery.

In the 1st section, a mosaic image is obtained, that includes of the fragments of associate input secret image with color corrections in line with a similarity criterion supported color variations. The section incorporates four stages: 1) fitting the tile pictures of the key image into the target blocks of a preselected target image; 2) dynamic the colour characteristic each of each} tile image within the secret image to show that of the corresponding target block within the target image; 3) pivoting every tile image into a direction with the minimum RMSE price with reference to its corresponding target block; and 4) implanting needed info into the created mosaic image for future healing of the key image. Within the second section, the ingrained info is extracted to recuperate the key image nearly lossless from the generated mosaic image. The section incorporates 2 stages:

- I. Extracting the ingrained info from the mosaic image for recovery of the key image, and
- II. Recuperating the key image victimisation the extracted info.

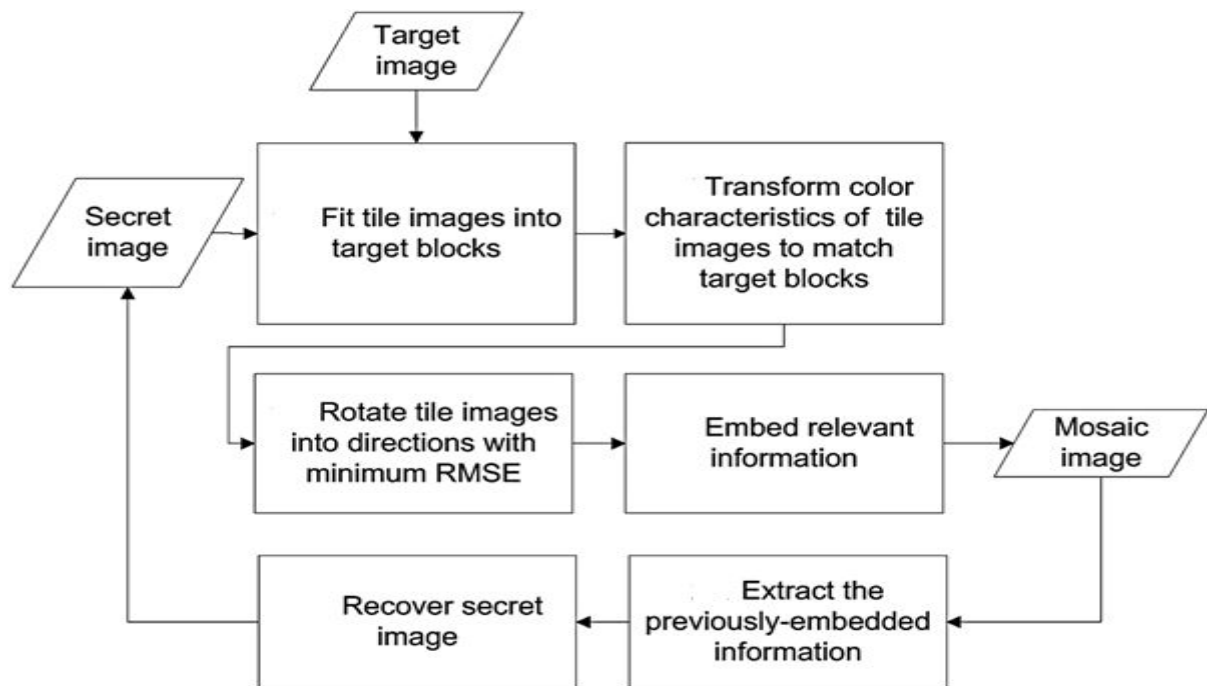


Figure 4: Block diagram of proposed system [1]

Proposed System Advantages

Proposed to conduct nearly lossless recovery of the initial secret image from the ensuing mosaic image

5.1 Mosaic Image Creation

Input is a secret image S, a target image T, and a secret key K. Output: a secret-fragment-visible mosaic image F.

- Resulting mosaic image.

I. Algorithm for Mosaic image creation

Input: a secret image S, a target image T, and a secret key K.

Output: a secret-fragment-visible mosaic image F.

Step 1: Take the input s are secret image, target image and key.

Step 2: Generate the tile blocks for secret image and target blocks for target image.

Step 3: Calculate the mean and standard deviation for each tile block and target block.

$$\mu_c = 1/n \sum_{i=1}^n C_i$$

Where C_i - pixel value of c-channels such as red, green and blue.

n- No of pixels

$$\sigma_c = \sqrt{1/n \sum_{i=1}^n (C_i' - \mu_c')^2}$$

Step 4: Calculate the average standard deviation for each block and sort them.

$$C_i' = q_c(C_i - \mu_c) + \mu_c'$$

Where - standard deviation quotient

Step 5: Sort the tile blocks and target blocks as per sorted average standard deviations respectively.

Step 6: Map sorted tile blocks with the sorted target blocks.

Step 7: Create mosaic image fitting tile box as per the mapped target blocks.

Step 8: Transform the color of all the pixel of each tile image using means and standard deviations.

Step 9: Rotate each transformed tile to 90,180 and 270 degrees and calculate root mean square error.

Step 10: Retain the rotation with minimum RMSE.

Step 11: Convert the mean and standard deviations for each tile block and mapped target block to binary.

Step 12: Convert tile rotation performed into binary.

Step 13: Concatenate the bit stream and compress into data to be embedded into the corresponding tile box of the mosaic image.

Step 14: Will finally get the output of mosaic image.

Example

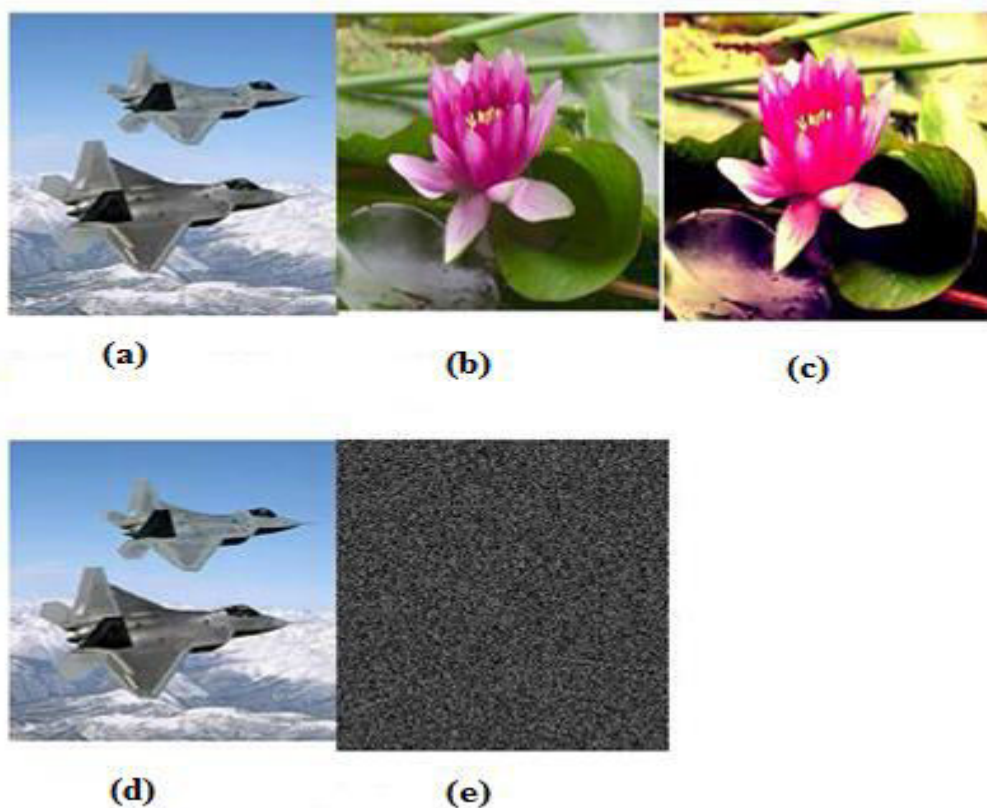


Figure 5: Mosaic image creation (a) Secret image. (b) Target image. (c) Mosaic image created (d) Recovered secret image using correct key (e) Recovered secret image using wrong key.

5.2 Security Consideration

Security is one of the most important parts of the proposed system. So, to increase tracking methods or perform computation on tile images to recover secret image. So if we take the no. of permutation here to be $n!$. So the user possibility to correctly guess no. of permutation is $p = 1/n!$ which is comparatively small?

As a reference we have a tendency to use the puzzle downside wherever we have a tendency to design up a whole image from a collection of little sq. blocks. Several strategies were planned to unravel such downside. Conjointly the puzzle wasn't attainable to unravel in polynomial times as a result of the time quality was large. Once n is smaller than a thousand or lesser it's attainable to separate it, victimization several compatibility metrics to extend the safety of our planned methodology we should always use an oversized worth of n . Our downside is additional advanced compared to the present because the color character of the sq. blocks is additionally being modified i.e. the adjacent pairs have totally different color thus here we'd like to perform greedy search victimization color linguistics between original fragment for image reconstruction.

If a hacker even gets the permutation values correct we'd still not understand the proper parameters for ill the \$64000 color of secret image as a result of those parameters for color recovery are encrypted in an exceedingly higher stream victimization secret key. At the worst case the hacker will observe some content of mosaic image and establish rough version of secret image. thus to extend the safety of the planned methodology against this type of attack, we should always randomise some data of secret image like position of pixels etc. before reworking the key image into mosaic image and conjointly solely users with key can get to understand the key image and recover it utterly.

APPLICATIONS

Currently, pictures from numerous sources square measure oftentimes utilised and transmitted through the web for numerous applications, like on-line personal photograph albums, confidential enterprise archives, document storage systems, and military image databases. These pictures typically contain personal or direction in order that they must be shielded from leakages throughout transmissions.

6. CONCLUSION

A new secure image transmission technique creates a meaty mosaic image and may additionally remodel the key image into a secret-fragment-visible mosaic image of a similar size and has a similar visual look because the target image that is preselected from the info. With this system user will choose his/her favourite image to be used as a target image while not the requirement of enormous info. Additionally the initial secret image may be recovered nearly lossless from the created mosaic image.

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Study Involvement And Academic Achievement Of Secondary School Students

Paper ID	IJIFR/V3/ E10/ 057	Page No.	3876-3880	Subject Area	Education
KeyWords	Study Involvement, Academic Achievement, 347 Students, Secondary Schools				

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Abstract

Study Involvement in studies not only makes the learning pleasant activity but also yields enhancement in learning outcomes of higher order and develops positive attitude towards learning and facilitates creative thinking of students who are involved devote more time and energy to academics, spend more time on campus, while participating actively in student organization, and having more positive interaction with faculty and staff. All of this leads to a more productive educational environment that benefits every part of the institution. The main purpose of this study is to be aware of the level of Study Involvement and Academic Achievement among Secondary School Students. This study also concentrates on comparing the students of different types of school with respect to their Study Involvement and Academic Achievement. To investigate the various objectives a sample of 347 students were selected using purposive sampling technique in the Villupuram District, Tamilnadu, South India.

1. INTRODUCTION

Academic Achievement refers to a student's success in meeting short or long term goals in education. It also refers to a person's strong performance in a given academic area. Academic achievement is the degree of academic learning by the person. Academic achievement of students is the important indicators in evaluating the education. All effect this system accomplished to realize this event. Secondary School (also called "High School") is a term used to describe an educational institution where the final stage of schooling known as secondary education and usually compulsory to a specified age, takes place. It follows elementary or primary education, and may be followed by University education.

2. STATEMENT OF PROBLEM

“Study Involvement and Academic Achievement of Secondary School Students”

3. OBJECTIVES OF THE STUDY

- I. To Study the level of Study Involvement and Academic Achievement among Secondary School Students.
- II. To Compare the boys and girls in their Study Involvement and Academic Achievement.
- III. To Compare the students of different types of school with respect to their Study Involvement and Academic Achievement
- IV. To find out the relationship between Study Involvement and Academic Achievement.

4. HYPOTHESES OF THE STUDY

- I. There is no significant difference in gender, types of school and locality with respect to study involvement of secondary school students.
- II. No significant difference is found in gender, types of school and locality with respect to academic achievement of secondary school students.
- III. A significant relationship exists in study involvement and academic achievement of secondary school students.
- IV. A significant relationship exists in study involvement and academic achievement with respect to gender, types of school and locality

5. RESEARCH METHODOLOGY

I. Sample For The Study

A sample of 347 students was selected using purposive sampling technique in the Villupuram District, Tamilnadu, South India

II. Tools

- a) Scale of study involvement inventory developed and validated by Asha Bhatnagar (1971) will be used for the study
- b) The academic achievements of the half-yearly examinations were obtained from the authorities of high schools. Since it is common examinations the scores obtained by the students are considered as standard scores.

III. Statistical Techniques Used

In the present study the relevant data collected and analyzed by employing the following statistical tools to arrive at meaningful conclusions.

- a) Descriptive Analysis
- b) Differential Analysis
- c) Correlation Analysis

6. DATA ANALYSIS

6.1 Descriptive Analysis

Table -1: Mean and Standard Deviation of the variable Study Involvement and Academic Achievement of Secondary School students.

Variables	N	Total Scores	Mean	Standard Deviation
Study Involvement	347	40	29.71	3.53
Academic Achievement	347	500	338.7	71.41

6.2 Differential Analysis

Hypothesis – 1 There is no significant difference in study involvement with respect to Gender, Types of school and Locality

Table -2: Mean and Standard Deviation and ‘t’ value of the variable Study Involvement of Secondary School students with respect to Gender, Types of School and Locality

Variables	N	Mean	SD	‘t’	Significance at 5% level
Boys	179	19.4	3.71	0.144	NS
Girls	168	29.0	3.3		
Govt. School	297	29.8	3.66	0.056	NS
Private School	50	29.0	2.53		
Rural	200	29.44	3.55	0.090	NS
Urban	147	30.08	3.48		

Hypothesis – 2 No significant difference exists in Academic Achievement with respect to Gender, Types of school and Locality

Table -3: Mean and Standard Deviation and ‘t’ value of the variable Academic Achievement of Secondary School students with respect to Gender, Types of School and Locality

Variables	N	Mean	SD	‘t’	Significance at 5% level
Boys	179	328.8	73.7	0.012	NS
Girls	168	337.9	72.6		
Govt. School	297	328.8	73.7	3.37	NS
Private School	50	337.9	72.6		
Rural	200	330.34	65.82	0.012	NS
Urban	147	350.12	77.10		

6.3 CORRELATIONAL ANALYSIS

Hypothesis – 3: There is a relation between study involvement and Academic achievement of secondary school students.

Table – 4: Showing relationship between study involvement and academic achievement of secondary school students.

Variables	N	'r'	'p'
Study involvement and Academic achievement	347	0.526	S

Hypothesis – 4: There is a relation between study involvement and Academic achievement of secondary school students with respect to Gender, Types of School and Locality

Table – 5: Showing relationship between study involvement and academic achievement of secondary school students with respect to Gender, Types of school and Locality

Variables	N	'r'	'p'
Boys	179	0.66	S
Girls	168	0.329	S
Govt. Schools	297	0.66	S
Private Schools	50	-0.27	NS
Rural	200	0.640	S
Urban	147	0.382	S

7. CONCLUSIVE FINDINGS

- There is a maximum level of study involvement of secondary school students
- The academic achievement of secondary school students are high level
- There is no significant difference between boys and girls , Government school and private schools and rural and urban secondary school students with respect to study involvement
- There is no significant difference between boys and girls and rural and urban school students with respect to academic achievement.
- There is a significant difference between Government school students and private school students with respect to academic achievement.
- There is a significant relationship between study involvement and academic achievement of secondary school students.
- There is a significant relationship between study involvement and academic achievement with respect to boys, girls, private, rural and urban secondary school students.
- There is no significant relationship between study involvement and academic achievement of Government secondary school students.

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Strength And Durability Properties Of M₃₀ Grade Of Concrete By Using Fly-Ash And Ceramic Wastes

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KeyWords	Ceramic Wastes, Fly-Ash, Compressive Strength, Split Tensile Strength, Flexural Strength, Durability Properties				

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Abstract

The ceramic waste generation now a days are becoming a threat for environment, so recent developments in use of these waste as a material for concrete is becoming more day by day, so in our work, in addition to normal conventional concrete, concrete is made by partial replacements of cement and coarse aggregate by fly-ash and ceramic wastes. This work includes the replacement of fly-ash to the cement in proportions of 10%,15% and 20% simultaneously we replace the ceramic wastes to the coarse aggregate in several proportions of 15%,20% and 25% respectively. Generally we observed that ceramic wastes gives good compressive strength from the past research works. The results which are obtained from the concrete made with fly-ash and ceramic wastes were compared with the plain conventional concrete of M₃₀ grade to study the mechanical behaviours such as compressive, flexural and split tensile strengths. This work can give assurance that ceramic wastes can be used as an alternative construction material for coarse aggregate and fly-ash for the cement. The results which are obtained in this work has significantly increased in compressive strength, split tensile strength as well as flexural strength up to 15% fly-ash and 20% ceramic wastes replacements and then after the decrement of strengths has been observed. Durability properties were also investigated to this concrete and compared with conventional concrete.

1. INTRODUCTION

Concrete is a composite material formed by combination of binding materials like cement, sand, water and aggregates. In these materials water, sand and aggregates are the natural resources. Typical concrete is mixture of fine aggregate, coarse aggregate, cement and water. Because of its convenient use, it is not only used in building construction but also in other areas like Roads, Harbours, Bridges and many more due to high demand of concrete the reduction of natural resources are also happened. So to avoid this reduction we progressed on the usage of alternative materials such as Fly-Ash, GGBS, Rice-Husk Ash, Coconut shells, Fibres, Ceramic Wastes etc. In our work we use fly-ash and ceramic wastes. However, the ceramic wastes are highly resistant to physical and chemical attacks. In present condition normally 15 to 30 percentages of ceramic wastes are generated from the production of ceramic industry about 100 million ton per year in India. The usage of the ceramic wastes in concrete also had some advantages i.e., the emission of CO₂ during hydration process is reduced due to ceramic wastes because these ceramic wastes are heated at higher temperatures up to 1300⁰C – 1500⁰C. We had learnt that due to heating of ceramic wastes it losses water absorption property and also gives high compressive strength.

Another material used in this project work is fly-ash for the cement in concrete. Fly-Ash is finely divided material which is obtained by the combustion of Bituminous Coal (or) Sub-Bituminous Coal (lignite). Fly-Ash is available in large quantities as waste products at thermal power plants. We can reduce the usage of construction materials by the use of this fly-ash. Fly-Ash is obtained more than 65% from the coal power stations as a huge amount of Waste and also impact the environment. So we can use the fly-ash to make the concrete and it reduces the environment impact. Fly-Ash will acts as a binding material like cement, so we can use this as a constructive material in concrete production for ordinary Portland cement and sand. These two materials such as ceramic wastes and fly-ash were used as alternative materials in production of concrete of various proportions for this research work.

2. EXPERIMENTAL INVESTIGATIONS

2.1 Materials Used:

In this project work we use several materials such as cement, sand, coarse aggregate, fine aggregate, water, ceramic wastes and fly-ash. The properties of these materials were tested according to (INDIAN STANDARD) codes of IS 456-2000, IS 383-1970 and IS 2386-1963.

2.1.1 Cement:

Ordinary Portland cement of 53 Grade was used for manufacturing of concrete. The properties of the cement were tested according to IS 456-2000 and was tabulated below table 1:

Table: 1 Physical properties of Cement

S. No.	Properties	Value
1	Normal Consistency of Cement	31%
2	Initial Setting Final Setting	29 min 9hours57 min
3	Specific Gravity of Cement	3.1
4	Fineness of Cement	2%

2.1.2 Fine Aggregate:

It consists of natural sand or well graded river sand which is passing through 4.75mm sieve was used as fine aggregate. The properties were taken on the basis of IS 383-1970 and IS 2386-1963 codes and those values are in below table 2:

Table-2: Physical properties of Fine Aggregate

S. No.	Properties	Value
1.	Specific Gravity	2.5
2.	Density kg/m ³	1580
3.	Zone	II

2.1.3 Coarse Aggregate:

Coarse aggregate includes Gravel, crushing of Parent Rock, Natural Rocks which are hard, strong. The coarse aggregate is taken which are retained on IS sieve No. 4 shall be taken. The Physical properties of coarse aggregate are in below table 3:

Table: 3 Physical Properties of Coarse Aggregate

S. No.	Properties	Value
1.	Specific Gravity	2.72
2.	Crushing value	14.21%
3.	Impact value	2.5%
4.	Density kg/m ³	1560
5.	Water Absorption	0.6%

2.1.4 Ceramic Wastes:

Ceramic Wastes are the wastes that are produced from the ceramic industry due to the failure of the products while manufacturing the ceramic products. These ceramic wastes gives good compressive strength and resistant to physical and chemical attacks. Normally 15-30% of ceramic wastes are generated from the production of ceramic industry. The properties of ceramic wastes are in below tables 4&5:



Figure 1: Ceramic Wastes

Table 4: Chemical Composition of Ceramic Aggregate

Chemical Constituent (wt%)	Recycled Ceramic Aggregate	
	Internal Part	External Part
SiO ₂	68.41	58.23
Al ₂ O ₃	24.46	9.10
Fe ₂ O ₃	0.94	0.91
CaO	0.63	11.80
MgO	0.19	0.67
Na ₂ O	1.65	2.38
K ₂ O	2.80	1.63
P ₂ O ₅	0.17	0.10
TiO ₂	0.55	0.10
ZrO ₂	0.08	12.62
others	0.12	2.46

Table 5 Physical and Mechanical properties of Ceramic waste

S. No	Characteristic	Value
1.	Grading Modulus	6.17
2.	Maximum Size(mm)	12.5
3.	Fine Content (wt.%)	0.16
4.	Density (kg/m ³)	2.39
5.	Water Absorption (wt.%)	0.55
6.	Flakiness Index (wt.%)	23
7.	Loss Angeles (wt.%)	20
8.	Total Porosity (vol.%)	0.32

2.1.5 Fly-Ash:

Fly-Ash is generally referred as ash which is formed due to combustion of coal. This will be obtained more than 65% from thermal power stations and this will act as a binding material in concrete production. Fly-Ash can be replaced for cement as well as for sand and this material is used for our work. The physical properties of the fly-ash are in below table 6:

Table 6: Physical properties of Fly-Ash

S.No.	Properties	Fly-Ash
1.	Fineness kg/m ²	351
2.	Bulk Density gm/cc	1.12
3.	Specific Gravity	2.33
4.	Colour	Grey

2.2 Concrete Mix Proportion:

The mix design has been done by considering the Indian Standards Codes (IS 10262-2009).The target mean strength obtained according to mix design is 38.25 N/mm² for the mix proportion which was observed as the cement content of 425.73 kg/m³ and the amount of Fine Aggregate as 622.52 kg/m³ and the coarse aggregate as 1153.71 kg/m³ and the

water to cement ratio is taken as 0.45. The concrete is mixed as at first the coarse aggregate and ceramic wastes are mixed for 1minute and then separately mix the cement, sand and fine aggregate until the uniform colour is obtained. After then all were mixed and then add the water to mix it thoroughly upto 4 minutes to get a homogenous mix. Then the specimens like (cubes, Beams and Cylinders) were casted and after 24 hours the moulds were remoulded. After that curing had done in normal water for all the specimens and the cubes were also cured in Sea-water and acid of CONC.HCL. The curing has been shown in below fig:



Figure 2: Normal Water Curing



Figure 3: Acid curing



Figure 4: Sea water curing

2.2.1 Brief Description of the project:

In this Study we replace the fly-ash to the cement and ceramic wastes to the coarse aggregate in the following proportions. The mix proportions were tabulated in table 7:

Table 7: Mix Proportions

Mix proportion	Cement %	Flyash %	Ceramic Waste %	Corse aggregate %	Sand %
V	100	0	0	100	100
V ₁	90	10	15	85	100
V ₂	90	10	20	80	100
V ₃	90	10	25	75	100
V ₄	85	15	15	85	100
V ₅	85	15	20	80	100
V ₆	85	15	25	75	100
V ₇	80	20	15	85	100
V ₈	80	20	20	80	100
V ₉	80	20	25	75	100

3. RESULTS AND DISCUSSIONS

3.1 Compressive strength for cube:

The compressive strength of the concrete cubes was calculated by using compressive testing machine (CTM) having the capacity of 2000 KN. Compressive strength is nothing but the capacity of cube to resist the loads and reduction of size acting on it. The compressive strength tests were done to cubes specimens of size 150*150*150 mm for 28, 90 and 120 days in normal Water, acid and sea water curing. The compressive strength results for a period of 7days curing are illustrated in table no 8 as well as the compressive strength results for 28, 90 and 120 days are mentioned in table no 9.



Figure 5: Compressive Strength Test

Table 8: Compressive Strength of cubes for a period 7days curing

Mix	Compressive Strength (Mpa) 7 days
V	29.30
V ₁	30.76

V ₂	30.58
V ₃	29.49
V ₄	27.63
V ₅	28.00
V ₆	25.54
V ₇	24.57
V ₈	24.48
V ₉	23.14

Table 9: Compressive strength of cubes in Water, Acid and Sea-Water Curing

Mix	Compressive Strength(Mpa) for 28 days			Compressive Strength(Mpa) for 90 days			Compressive Strength(Mpa) for 120 days		
	Water Curing	Acid Curing	Sea-Water Curing	Water Curing	Acid Curing	Sea-Water Curing	Water Curing	Acid Curing	Sea-Water Curing
V	40.20	38.64	39.67	41.80	40.80	41.73	42.96	41.32	42.84
V ₁	40.32	38.10	40.17	42.33	39.85	42.01	42.45	39.94	42.32
V ₂	41.65	37.63	38.59	42.89	38.90	40.09	43.10	39.98	41.64
V ₃	40.69	38.20	39.82	42.31	39.23	41.97	43.64	40.23	41.97
V ₄	42.76	38.69	38.09	44.89	40.31	39.95	45.42	41.42	40.88
V ₅	40.13	37.12	40.25	41.57	38.53	41.77	43.20	38.96	42.53
V ₆	38.34	36.48	39.64	40.56	37.42	41.85	40.68	38.43	40.39
V ₇	37.65	35.78	37.58	39.76	37.31	39.38	38.96	37.65	39.57
V ₈	37.69	34.32	36.73	38.97	35.38	38.12	38.72	36.63	38.72
V ₉	36.48	33.26	35.98	38.01	34.19	37.99	38.64	36.24	37.42

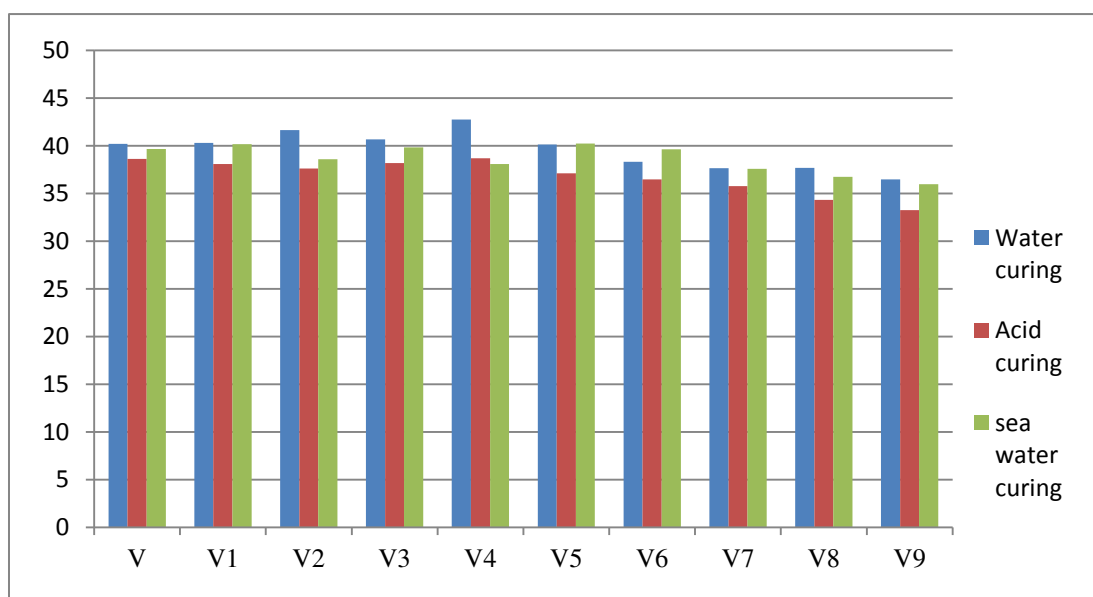


Figure 6: Graph for Compressive Strength results of 28 days Water, Acid and Sea-Water Curing

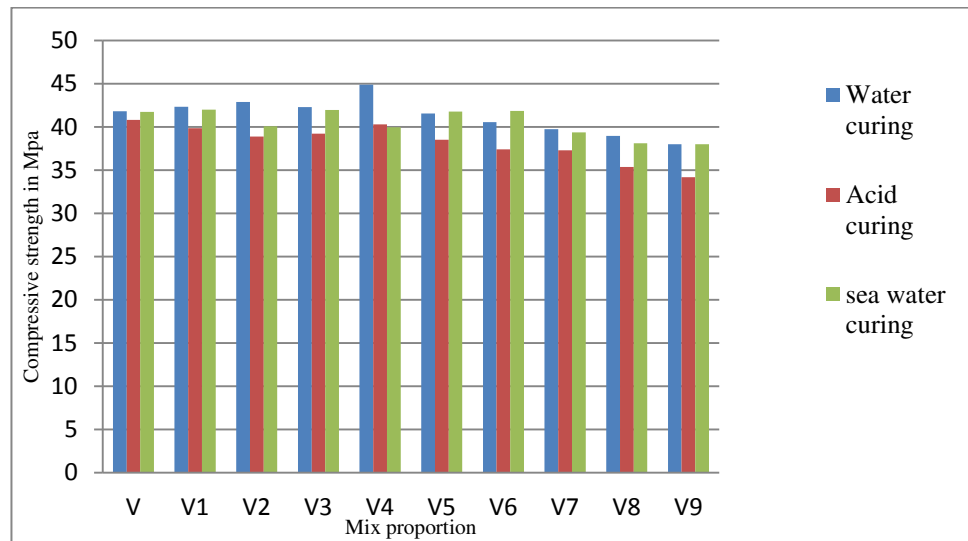


Figure 7: Graph for Compressive Strength results of 90 days Water, Acid and Sea-Water Curing

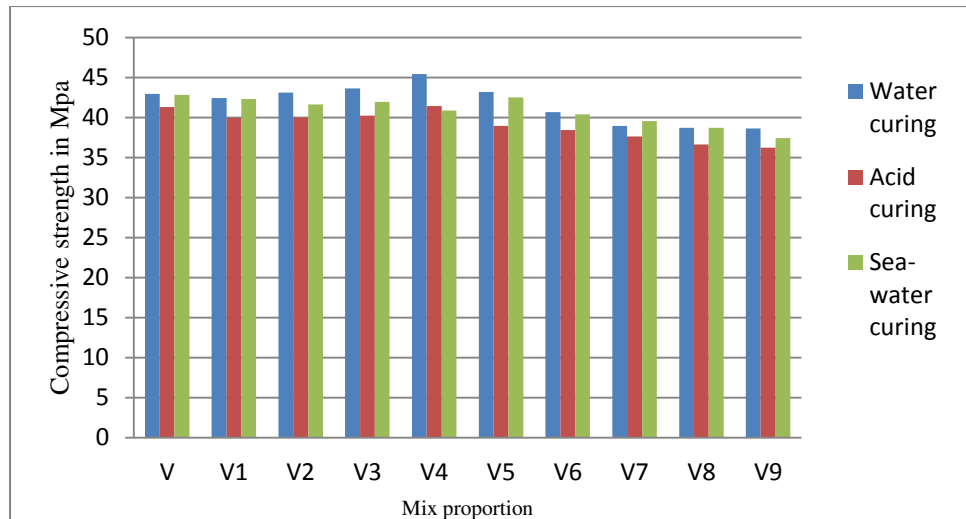


Figure 8: Graph for Compressive Strength results of 120 days Water, Acid and Sea-Water Curing

3.2 Split Tensile Strength for Cylinders:

We know that concrete is weak in tension. Tensile Strength is one of the important properties of the concrete. The concrete cannot resist the direct tension because of its low tensile strength and brittle nature. So the Tensile strength should be tested necessarily to determine the load at which the concrete member may fail. In this work the tensile Strength is tested and the values are mentioned in table 10:

Table 10: Split Tensile Strength of Cylinders in water, acid and sea-water curing

Mix	Tensile Strength(Mpa) for 28 days			Tensile Strength(Mpa) for 90 days			Tensile Strength(Mpa) for 120 days		
	Water Curing	Acid Curing	Sea-Water Curing	Water Curing	Acid Curing	Sea-Water Curing	Water Curing	Acid Curing	Sea-Water Curing
V	4.43	4.35	4.82	4.82	4.42	4.29	4.96	4.31	4.32
V ₁	4.53	4.32	4.43	4.97	4.49	4.26	4.94	4.24	4.36

V ₂	4.51	4.29	4.34	4.92	4.53	4.32	4.88	4.12	4.41
V ₃	3.90	4.34	4.41	4.30	4.44	4.49	4.42	4.27	4.52
V ₄	4.57	4.35	4.42	4.99	4.59	4.54	4.96	4.32	4.38
V ₅	4.10	4.18	4.44	4.50	4.21	4.59	4.36	3.98	4.27
V ₆	3.70	3.96	4.29	3.98	3.87	4.24	4.02	3.87	4.08
V ₇	3.84	3.70	4.08	4.26	3.94	4.16	4.32	3.64	3.78
V ₈	3.26	3.08	3.87	3.60	3.57	3.76	3.85	3.12	3.64
V ₉	2.94	2.86	3.54	3.20	3.22	3.42	3.39	2.94	3.32

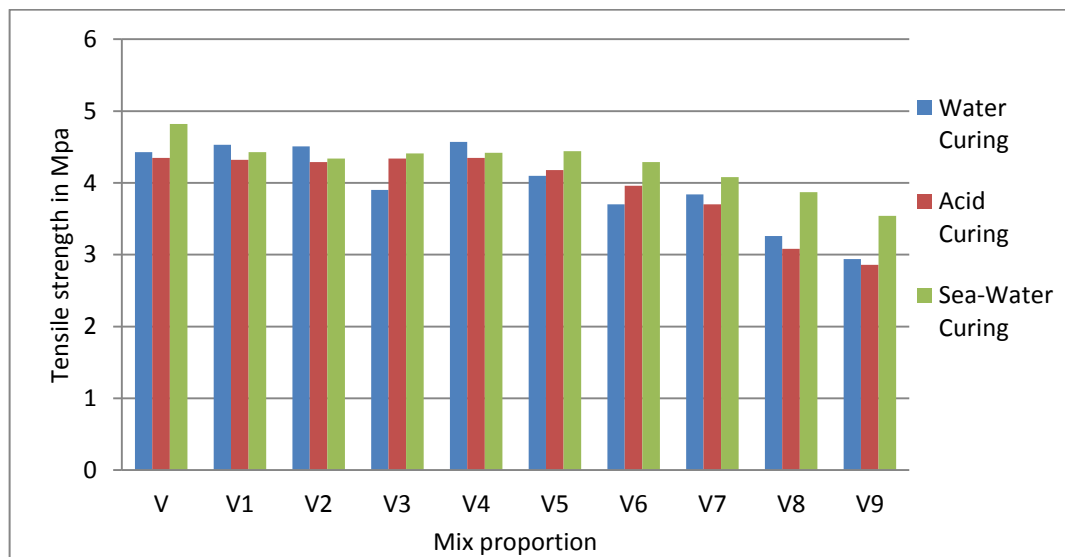


Figure 9: Graph for Tensile Strength results of 28 days Water, Acid and Sea-Water Curing

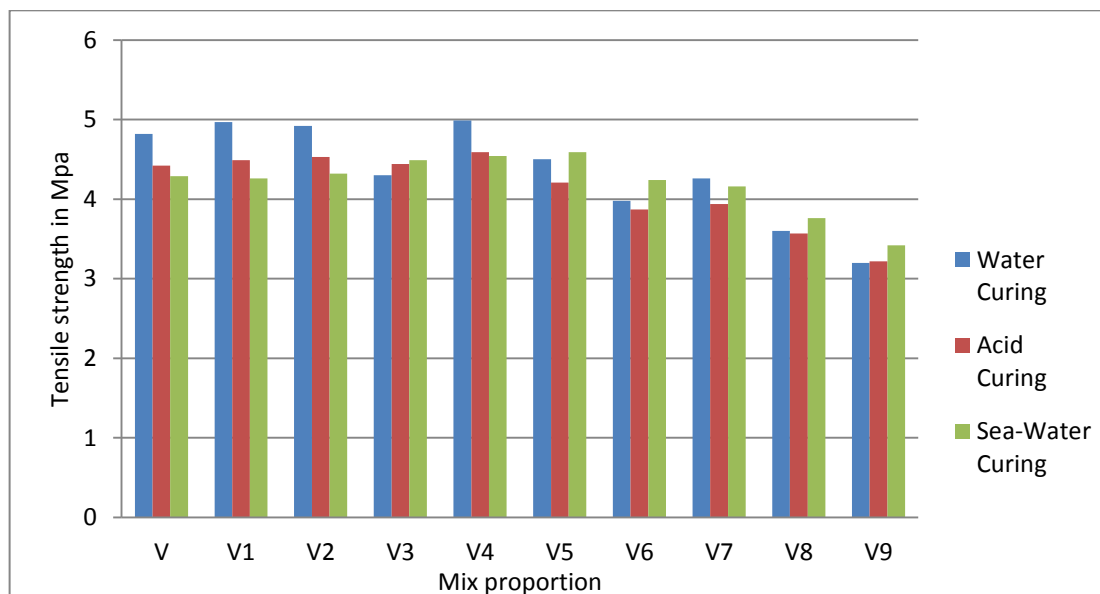


Figure 10: Graph for Tensile Strength results of 90 days Water, Acid and Sea-Water Curing

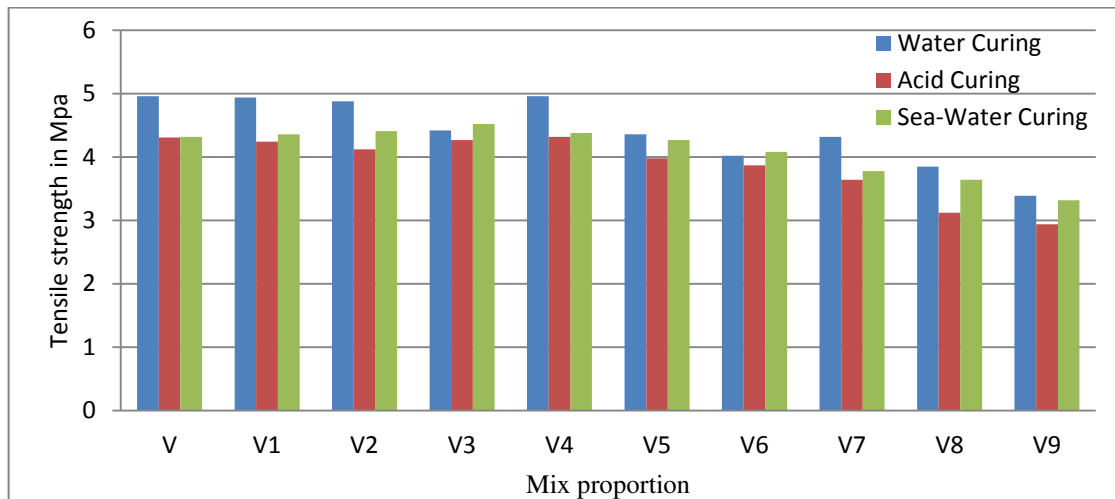


Figure 11: Graph for Tensile Strength results of 120 days Water, Acid and Sea-Water Curing

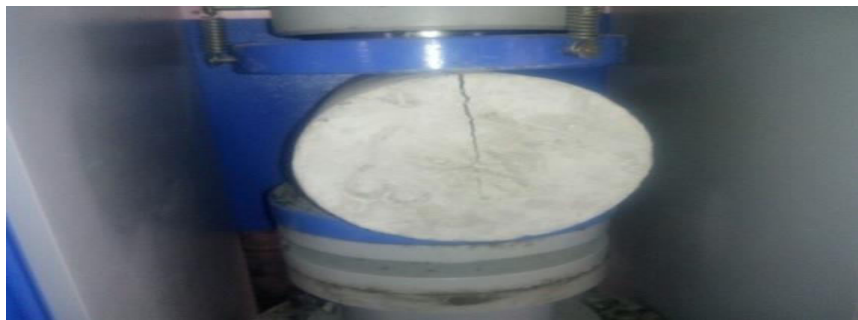


Figure 12: Split Tensile Strength

3.3 Flexural Strength for Beams:

Flexural strength is nothing but Modulus of rupture bend Strength or a fracture strength of a material. Flexural strength is defined as a material's ability to resist against deformation under load. For this tests we casted the beams of size 100*100*500 mm. In this test the transverse bending test is mostly used and the three point loading is preferred for this rectangular specimens. These tests were followed by considering the IS: 516-1959 codebook. The strength results were tabulated below in table 11:

Table 11: Flexural Strength for Beams of 28days water curing

Mix	Flexural Strength (Mpa) 28 days
V	6.60
V ₁	6.72
V ₂	6.55
V ₃	6.34
V ₄	6.60
V ₅	6.20
V ₆	5.90
V ₇	5.59
V ₈	5.26
V ₉	5.80

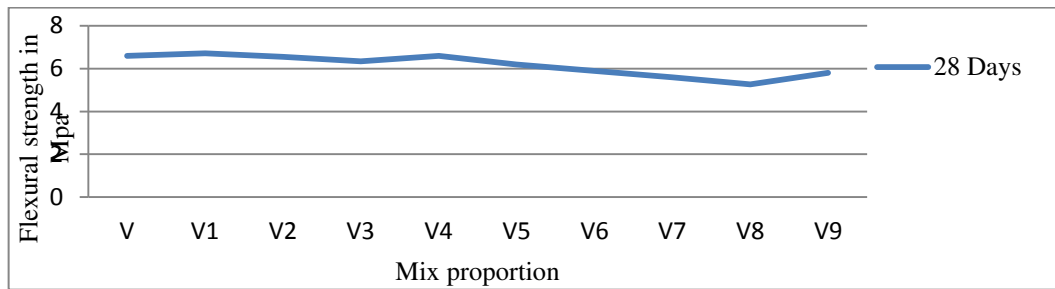


Figure 13: Graph for Flexural Strength of Beams for 28days water curing



Figure 14: Flexural Strength

4. CONCLUSIVE FINDINGS

Results in this study on compressive strength, Split Tensile Strength and Flexural Strength with different proportions of Ceramic Wastes and Fly-Ash replaced Concrete have been showed the good comparative results. The main findings of this study are:

- The replaced concrete with 15% Fly-Ash & 15% Ceramic Wastes shows higher compressive strength than conventional concrete in normal water curing.
- Ceramic Wastes based Concrete of 15% ceramic wastes and the 15% Fly-Ash replacement shows increase in Split Tensile Strength.
- Ceramic Wastes based Concrete of 20% ceramic wastes and the 15% Fly-Ash replacement shows increase in Flexural Strength.
- Ceramic Wastes based Concrete in acid curing with 15% ceramic wastes and the 15% Fly-Ash replacement shows a higher compressive strength than Conventional concrete.
- Ceramic Wastes based Concrete in sea-water curing with 20% ceramic wastes replacement and the 15% Fly-Ash replacement shows a higher compressive strength than conventional concrete.
- At constant Fly-Ash increase in Ceramic Waste to the concrete shows a decrement in Compressive strength.
- The Compressive strength results of Ceramic wastes based concrete which are obtained for 90 days in water, sea-water and Acid curing shows higher strength at 15% Fly-Ash and 15% Ceramic wastes replacements.
- The Durability properties are good at 90 days of curing for the ceramic wastes based concrete.

- ix.) Split-Tensile strengths are increased upto 15% Fly-Ash and 15% ceramic wastes and then decreased in 90 days water curing.
- x.) In Sea-Water Curing and Acid Curing at 15% Fly-Ash compressive strength is high with 15% & 20 % Ceramic Wastes replacements simultaneously.

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An Analysis Of Work Stress Among Employees In Retail Stores With Special Reference To Coimbatore City

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Abstract

Stress is a reaction to an incentive that irritates our physical and mental equilibrium. In other words, it's an infinite part of life. Stress has been shown to be either directly or indirectly responsible for early and untimely deaths through heart attack, stroke, high blood pressure, and a multitude of other stress related illnesses. The study focused on analysis of work stress among employees in retail store. Employees in retail have to balance the expectations of management and customers. Stress is a potential method of reducing the negative effects of retail role stressors may help to further our understanding of how to better manage retail employees.

1. INTRODUCTION

Stress has become a worldwide phenomenon, which occurs in various forms in every workplace. In today's work life, employees generally work for longer hours, as the rising levels of responsibilities require them to exert themselves even more strenuously to meet rising expectations about work performance (Dwamena, 2012).

Stress in the workplace is a growing concern in the current state of the economy, where employees increasingly face conditions of overwork, job insecurity, low levels of job

satisfaction, and lack of autonomy. Workplace stress has been shown to have a detrimental effect on the health and well being of employees, as well as a negative impact on workplace productivity and profits. There are measures that individuals and organizations can take to alleviate the negative impact of stress, or to stop it from arising in the first place. However, employees first need to learn to recognize the signs that indicate they are feeling stressed out, and employers need to be aware of the effects that stress has on their employees' health as well as on company profits (Bickford, 2005).

2. OBJECTIVES OF THE STUDY

- To analyze the level of work stress among the employees
- To identify the major stress factors
- To examine the relationship of demographic factors on work stress

3. REVIEW OF LITERATURE

➤ **Negi (2014)** examined the impact of work stress on job performance. The study analyzed the effect of various factors like work pressure, working conditions, mismatching capabilities, resources and needs on the employees. The study concluded that stress affects the employees work performance, organizational climate, family and personal life.

➤ **Adetayo et al (2014)** investigated the effect of work overload, career development and work/family conflict on performance of workers. Tiredness, worry, unhappiness, weakness, headache, and anger were identified to be the major factors which affect the workers performance. The study concluded that job stress has significant effect on employees' performance.

➤ **Surti and Ambavale (2013)** stated that retail sector is witnessing a revolution in India. According to the study, the major factors which affect the employees of garments are health, work environment, job, emotional stability, personal relation, work load and appreciation and feedback. The study showed that the respondents have high stress based on factors health, emotional stability, personal relation, and appreciation and feedback. The stress level is low based on work environment, work load and job. The study concluded that stress is high among the respondents, irrespective of age group or their gender.

➤ **Noruzi (2012)** in his study examined, the stress factors related to the strategies to cope with of employees quoted that stress is one of the biggest killers in life. So many health problems are attributed to it like abusing our bodies, minds and souls. The ultimate goal is balanced life, with time for work, relationship, relaxation, and fun – plus the resilience to hold up under pressure and meet challenges head on.

4. RESEARCH ANALYSIS

Tools used for analysis

Percentage analysis, Mean and Standard deviation and Correlation have been used to analyze.

4.1 Percentage Analysis

- Out of 150 respondents, 63 (42%) respondents are in the age group of 31-45 years, 50 (33.3%) respondents are in the age group of 20-30 years, 29 (19.3%) respondents are in the age group of 41-50 years and 8 (5.3%) respondents are in the age group of above 50 years. It is inferred that majority of the respondents (42%) are in the age group of 31-45 years.
- 92 (61.3%) respondents possess only school education, 24 (16%) respondent's poses UG degree, 23 (15.3%) respondents are illiterate and 11 (7.3%) respondents have done their diploma. It is inferred that majority of the respondents (61.3%) possess only school education.
- 59 (39.3%) earn Rs.5001-10000, 39 (26%) earn Rs.10001-15000, 25 (16.7%) earn Rs.3001-5000, 18 (12%) earn less than Rs.3000 and 9 (6%) earn more than 16000. It is inferred that majority of the respondents (39.3%) earn between Rs.5001-10000.
- 95 (63.3%) respondents are married and 55 (36.7%) respondents are single. It is inferred that majority of the respondents (63.3%) are married.

4.2 Descriptive Statistics

- The highest mean score of 3.60 implied that the respondents agree that they are satisfied with the growth and developmental opportunities. The average mean score of 3.49 implied that respondents are neutral in their opinion towards overall satisfaction
- The highest mean score of 3.35 implied that the respondents are neutral in their satisfaction with employees regularly participate in decision making, problem solving and goal setting. The average mean score of 3.26 implied that respondents are neutral in their opinion on satisfaction with control and involvement.
- The highest mean score of 3.79 implied that the respondents agree that they are satisfied with the employee regularly participate in employee training and development activities. The average mean score of 3.59 implied that respondents agree in their opinion towards satisfaction with growth and development.

4.3 Findings

- Age of the respondents has positive relationship with the level of stress.
- Educational qualification of the respondents has positive relationship with connection with employer and has negative relationship with growth and development.
- Income of the respondents has positive relationship with control and involvement and the relationship in the workplace has negative relationship with other work stress factors, workday stress and cuts laid down by the employer.
- Work experience of the respondents has negative relationship with other work stress factors.
- Family size of the respondents has positive relationship with connection with employer and has negative relationship with average level of stress, work stress factors and cuts laid down by the employer.

Table 1: Final Findings

Particulars		Overall Satisfaction	Control And Involvement	Growth And Development	Work-Life Balance	Employee Recognition	Health And Safety Practices	Relationships In The Workplace	Connection With Employer	Workday Stress	Average Level Of Stress	Top Five Stress Factors	Other Work Stress Factors	Crossover Between Work And Family Duties	Cuts Laid Down By The Employer
Age	Pearson Correlation	-.043	.137	.101	.085	-.051	-.002	.043	-.109	.155	.184*	-.088	-.095	-.060	-.099
	Sig. (2-tailed)	.603	.095	.217	.300	.538	.981	.599	.182	.058	.024	.286	.247	.465	.228
Educational qualification	Pearson Correlation	-.041	.001	-.202*	-.156	-.069	.043	.046	.175*	-.140	-.115	.085	-.137	-.030	-.094
	Sig. (2-tailed)	.617	.991	.013	.056	.400	.604	.572	.032	.088	.160	.304	.094	.716	.252
Income	Pearson Correlation	.014	.171*	-.053	.104	-.026	-.034	.185*	.144	-.184*	-.050	.065	.277**	-.067	-.225**
	Sig. (2-tailed)	.863	.037	.517	.203	.749	.675	.024	.078	.025	.547	.428	.001	.417	.006
Marital status	Pearson Correlation	-.068	.033	.077	.024	-.159	-.147	-.024	-.090	.135	.121	.084	-.037	-.147	-.058
	Sig. (2-tailed)	.410	.691	.352	.769	.052	.072	.775	.275	.100	.140	.305	.651	.073	.481
Gender	Pearson Correlation	.029	-.104	.022	.115	.023	.026	-.098	-.024	-.041	-.145	.010	.070	.132	.156
	Sig. (2-tailed)	.729	.207	.793	.161	.782	.748	.232	.768	.616	.076	.900	.395	.107	.056
Year of experience	Pearson Correlation	-.079	.073	-.115	-.063	-.133	-.159	.122	.028	.046	.025	.032	.217**	-.122	-.102
	Sig. (2-tailed)	.339	.378	.160	.440	.104	.052	.137	.732	.574	.766	.694	.008	.138	.216
Family size	Pearson Correlation	.021	.122	-.047	-.036	-.017	.020	.137	.179*	-.140	.203*	.091	.244**	-.061	-.247**
	Sig. (2-tailed)	.798	.137	.567	.661	.837	.805	.094	.028	.088	.013	.266	.003	.456	.002
Area of residence	Pearson Correlation	.041	.049	.095	.314**	.138	.056	.181*	.144	.089	-.005	.068	-.086	.178*	-.019
	Sig. (2-tailed)	.617	.550	.247	.000	.093	.499	.026	.078	.279	.950	.410	.294	.029	.819
Type of retail stores	Pearson Correlation	.185*	.020	.257**	.102	.172*	-.071	-.024	.024	.133	.088	.160	.153	.163*	.021
	Sig. (2-tailed)	.024	.811	.002	.212	.036	.389	.771	.769	.105	.283	.050	.061	.046	.795

5. SUGGESTIONS

- Employees to be trained with stress relief programs to show their full efficiency in the work.
- Job rotation should be done so that employees feel committed to the work they are doing.
- Medical facilities provided to be improved so that psychological stress can be reduced.
- Creativity rewards and incentives should be provided.
- Opportunities for career advancement to be given.
- Frequent informal interactions between employees and employer are also suggested.

6. CONCLUSION

Stress as a process involving a person's interpretation and response to a threatening event. Stress is a part of everyone's life. Stress is not something to be dismissed as being just part of the job, or the price you pay for being successful in your

career. The mental and physical health of employees suffers due to unhealthy work environment, stress is still seen as a sign of weakness in many organizations, and it is kept quiet so as to avoid negative repercussions.

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The Importance Of Animation As a Visual Method In Advertising

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Abstract

This research paper covers the detailed area of the selected research which is covering the contents of emergence of animation as a method of promotion in advertising. In this study we have selected few big examples of multi-national companies that state the importance of animation in field of advertising. Study concluded that animation is of paramount importance in sustenance of any company in today's tech era which can only be achieved by animation and motion graphics.

1. INTRODUCTION

What is animation all about? Animation is considered as a state of being full of life if asked in layman language. Technically, we all are familiar with Wikipedia term that it is the technique of photographing continuous drawings or puppets or doodles to create an illusion of movement when the film is shown in as sequence. It is also known that nowadays visually teachings and awareness is grasped more easily and quickly by anyone. This is where Animation can be the real saviour. Animation can bring life to the product and keep audiences engaged with simple and personalized visuals for better conceptualization. We all must be aware about Microsoft Office products include an animated office assistant, *Clip it*, to aid beginner users with the program who would offer tips and suggestions, and users can click on the icon for any additional help. That was just the beginning of animation era. Prior marketing research has mostly addressed animation in the context of banner advertisements on Web sites. Evidence has suggested that viewers are repelled by blinking banner ads. Yet, Hong et al., 2004, have illustrated that an animated flashing item is able to attract user's attention. Since human mental resource is limited, not all the information can be stored for a longer duration. However, studies have

shown that objects which evoke orienting response of customers. Animations allow for easy processing of information without having to deal with the technical jargon and strain their minds. With social media trending, news spread like fire. The interactive nature of social media has its advantages when it comes to micro-videos or campaigns. Remember, visitors to social media are all in for entertainment and these videos (animation based) are just ideal.

Say, employing a friendly faced mascot to run your campaigns which can definitely boost brand awareness and promotion. www.ZD.Net (1996) found that animations increased click through rates by at least 15%, and as much as 40% (Research, 1998). We are all familiar with Wrigley's orbit gum advert, which revolves mainly around a sandwich animated character. Earlier they were restricted to filming but with time they have involved an animated character beside an actress.

1.1. Famous Companies campaigning with animated characters

A simple example we all can relate to is 'Cornelious', the Corn Flakes Rooster, a simple concept that made an ideal breakfast. This mascot not only became favorite among toddlers but also among adults. Moreover, animation is not only restricted to cartoons and films. Biggest mnc's & top-notch service providers are inclined towards animated advertising as it is pocket friendly, cognizant and quick. Another very interesting example of animation usage in advertising company is ZooZoo by Vodafone. These are advertisement character promoted by Vodafone India since the Indian Premier League 2 (IPL). These are white creatures, with ballooned bodies, and egg heads that are used to promote value added services of Vodafone. The advert was created by Ogilvy and Mather. This was one mascot which is still loved by all age groups. The message passed on by the company was short, crisp, unique and quite interesting. After this successful campaign, most of the multi-national companies took shed under animation ads and banners.

We can also take another example but from different fields. Animated character or motion graphics is not only confined to food & drink or value added services area but also have expanded towards social media. Larry the bird is the name of mascot of Twitter.inc. Twitter's creative director Douglas Bowman was behind the evolution of Larry the bird logo & mascot since the company was founded in 2006. The trickle of animation has started with big brands to start up in whole world.

1.2. New stage set for animated commercials

The animation process results in motion graphics which are created by recording a series of still images in various positions of incremental movement, which when played back no longer appear individually as static but as combined to produce the illusion of unbroken motion (<http://encarta.msn.com>; contributed by Furniss 2006). Some researchers emphasize that animation is an effective design tool for capturing viewer interest and attention. Animation is usually categorized as (Frierson 1994; Furniss 1998), including Computer Graphic Image animation, clay animation, cartoon animation, film animation, drawn animation, pixilation, puppet animation, and silhouette animation. There are thirteen different types of animated commercials, which fall into several functional

categories: explanation, demonstration, big model, slice of life, fiction, documentary, comparison, image building, symbol, spectacular, production, commercial, and humour. The most common type of traditional design technique for animation is 2-D. Advanced technology can create a new style animation which is 3-D. In current industry, clay animation and computer generated animation have become the most popular type of animation in film and television commercials.

1.3 How exactly can animation help in successful advertising?

It is very important for an advert to be attention grabbing, informative, memorable, alluring and easy to comprehend by any range of customers. This target can only be achieved by use of animations in adverts, banners and videos.

It helps in delivering content in a format that can surpass perception about any character or reality. Company can use animation to make their customers feel aliveness. The main reason of using animation is that it is unique, trendy, eye-catching and less tedious as compared to filming any real character or human being. But the challenge lies in making advert more original, the more originality, merrier it is for customer to remember it and buy the product. Another advantage of using it is, you can create any environment by your imagination, and you are not restricted by any challenges faced by camera crew.

Animations are fun. They have an element of surprise that make users want to share with their friends or group. It is all about creativity. There is no limit. Guaranteed is a brand boosting but not just that, you're headed to win a lot of hearts and have a whole lot of eyes glued. These days it is not necessary to spend thousands on the production of commercials and informative videos. Anyone with the right software can now be the face of a brand. The difference between meritocracy and excellence comes with creativity. Creativity can be achieved when you don't have too much limitations and when you see a world of possibility. Instead of struggling to direct your cast, you can choose what your animated character will say, and even how and with what emotions they will say it. The best of it is animation enables you to have some fun.

2. OBJECTIVES OF THE STUDY

Following are the main objectives of the study:

- i.) To check the effect of animation on company's growth.
- ii.) To have a check on audience engagement in any of the adverts or videos made on basis of animations or motion graphics.
- iii.) To what extent people are able to conceive information passed on by animated character.
- iv.) The check the effect of animation on audience.
- v.) To check the influence of age factor on audience regarding animation.

3. RESEARCH METHODOLOGY

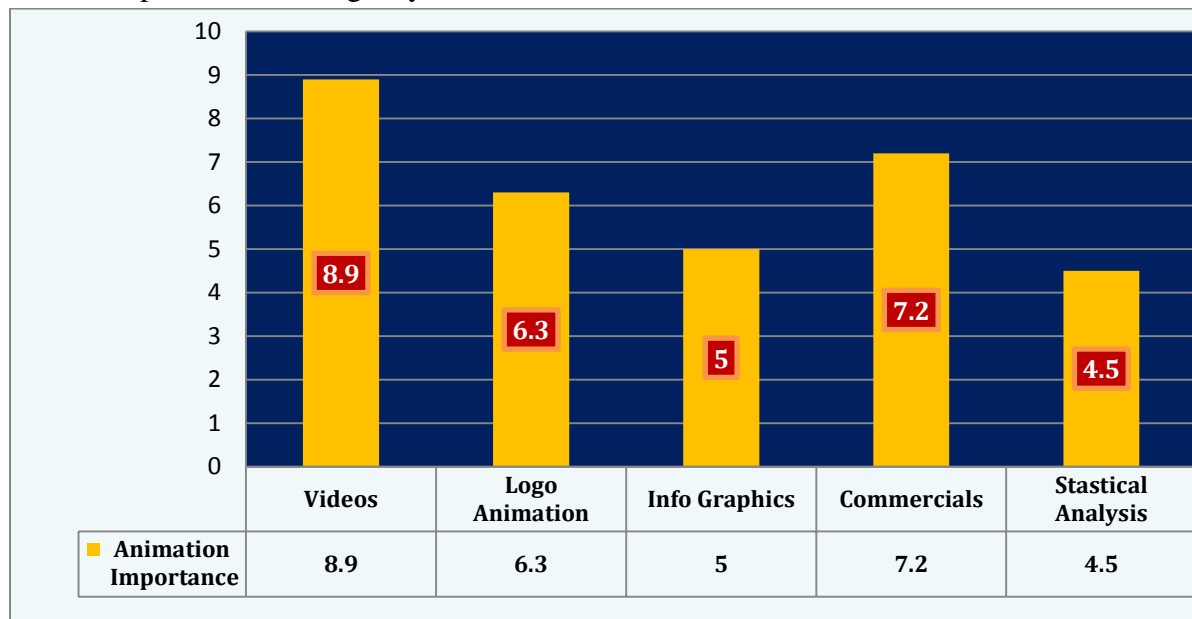
- i.) The design selected for this report is descriptive research studies depending on various variables, for example, doodles, 3D animations, cartoons etc.

- ii.) The data was collected from primary and secondary resources; published articles, internet and survey among different age groups of people and e-commerce websites.
- iii.) We have conducted experiment on leading e-commerce websites and telecom industry who are promoting their offers and products mostly with the help of motion graphics, animated graphics and animated banners and advertisements. Discussion with some of the employees of e-commerce website to know impact of animation in advertising.

4. Research & Findings

Given the technical and internet affected environment, a study was designed to test how animation affected an e-commerce website. The study investigated response time in a visual task, and how the customers felt about the event or task.

We asked about importance of animation in terms of promoting a new product or any new offer from an e-commerce website www.amazedeal.in, to which the answer was quite predicted. As a start-up, it was crucial for them to have a good kick start, and animated videos helped them in a big way.



Graph 1: "Importance of Animation in promotion"

It has also been noticed that animation influence's viewing in every age group. Whether it is Children or adults, they all love to watch videos which are animated as compared to one's filmed with celebrity or any other individual.

5. SIGNIFICANT OUTCOMES

5.1 Search Ratio

It has been noticed among all individuals that when they search and clicked on the links which have presence of animated banners in their ads or videos. Concluding that if companies have set up some decent and not alluring animated banners then they do not capture much attention while most exclusive and eye-catching banners will instantaneously grab anyone's attention; producing a rippling effect.

Depending upon advertising objectives, marketing communication or direct marketing, it's the banners that might attract impressions or clicks. When talked about impressions- it means how many times an advertisement was shown on the web or television. Click shows us how often an advertisement was clicked and it was routed to a targeted website or webpage [Lohtia et al., 2003]. The ratio of clicks and impressions indicates and serves as a measure of advertising effectiveness with animated media.

5.2 High resolution creating problem with UI

It has also been noticed that there is a big search difference when banners & animated videos are created on high resolution or are bigger in size. This creates a problem on User Interface of website, concluding decline in search time and site drop out. However, these results are an indication that if animation do have an impact on any task, the effect is small although. Furthermore, in case of heavy animation files the UI of website gets disturbed. Quite frequently, websites list their internal links & back links at the top of page and in every directory, which is similar to that performed in the experiment.

5.3 Different website, different results

It has been noticed that different results could occur on a reading-intensive website and some other different results could occur on e-commerce website. However, the result is same but with a difference in terms of content and visually. This experiment intentionally negates appeal of banner content; people had no incentives to look at the banners & animated media, and they were encouraged to complete their search task quickly. Bendazzi did much of his research at international animation festivals, the only place where one could find some of the marginal works he discusses, such as Mongolian animation; to give an idea of the extent of his coverage, the influential Disney studio takes up only 10 of the book's 444 pages of text. Bendazzi covers the period between 1888 and 1990 in five sections, with additional sections devoted to new technologies (ten pages), a bibliography (including national publications and resources related to characters, filmmakers, education, aesthetics and other topics), and indexes to names and titles. As the book's title suggests, filmed animation is of central concern in this book; made-for-television animation and other forms are not given much attention.

Two useful instructional guides related to the production of animation are Kit Laybourne's *The Animation Book*, published by Crown in 1979, and Richard Taylor's *The Encyclopedia of Animation Techniques*, published by Running Press in 1996. The reprint of Edwin G. Lutz's book, *Animated Cartoons: How They Are Made, Their Origin and Development* (originally published in 1920 by Charles Scribners Sons), by Applewood in 1998, is generally of interest to researchers working on Disney, since this is the book that the young Walt used to learn the basic principles of the animation process. The book overviews processes used during the 1910s and provides practical information on principles of movement. Linda Kaplan Thaler, CEO of the Kaplan Thaler Group Ltd., a New York-based agency, has a track record of developing innovative and attention-grabbing advertising approaches. Kaplan Thaler said that the biggest challenge was trying to find some way to build the AFLAC brand, which is an acronym, not a word. Finally,

when a creative employee said the name sounds like the squawking of a duck, the team was off and running.

6. CONCLUSION

In today's era, youth is the driving force behind any organization or company as they are one that form huge percentage of population. They are the ones who are now fully aware about environment and latest trends. They are the one which gets influenced by quirky and interesting animations used by any company for advertising purpose.

Recent research has suggested that hedonic and utilitarian nature can affect the way products are acquired and consumed (Wertenbroch 1998), suggesting that the promotional strategies for particular product genre may vary according to their nature (Vaughn 1986). Therefore, it is useful to study the impact of animation on consumer perceptions of and attitudes toward hedonic and utilitarian products.

Last but not the least, there were some limitations in the experiment. First, employees were from one sector of business industry who was more interested in advertising to regional area rather than to others who are spread across country. Secondly, we have not assessed attitude towards advertising in general. Thirdly, the disadvantage of an experiment is that respondents are passively confronted with the same stimulus; this secures high internal validity but at the same time threatens external validity. After research it was found that humongous percentage of people use internet, social media and electronic devices to fetch any information or shop or put query. For all these means, animation has been considered as most effective means of communication. Effect of animated banner, ads, and commercials on the tasks is worthwhile on the web community. This study also bridges the traditional attention-capture approach and web marketing research. The experiment probed a few individual features of web and television.

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OCR For Handwritten Devanagari Script

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Key Words	OCR, Devanagari, Segmentation, Feature Extraction, SVM				

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Abstract

Optical Character Recognition (OCR) is the method used to recognize the character. In this, scanned document image is converted into editable text. The document is either machine printed or handwritten. It is easy to recognize machine printed documents but difficult for handwritten scripts. The steps involved in OCR system are pre-processing, segmentation, feature extraction and classification. The segmentation and feature extraction are very important steps in OCR system. As in Devanagari scripts complexity of word is more as compared to some another language like English. Devanagari script covers most of the Indian languages like Marathi, Hindi, Sanskrit, etc. The drawbacks of OCR for handwritten Devanagari script are: Difficult to recognize the joint, overlapping text. In case of poor segmentation OCR cannot identify the difference between text and non-text elements. For non-text elements like graph, symbol, picture, equation etc. OCR generates garbage elements. The methodology we are going to use for feature extraction is Gradient method and for classifier Support Vector machine (SVM) is used.

1. INTRODUCTION

Pattern recognition is a technique used in executing human tasks on computers. Pattern recognition plays an important in optical character recognition and in many more application such as document processing, robot vision, etc. Pattern recognition helps to speed up processing time. Optical character recognition of characters or word is one of the most successful applications in computer vision domain. OCR system steps are pre-

processing, segmentation, feature extraction, Classification and post-processing. In order to recognize the text contained in a document, it is usually segmented into lines, words, and characters. Segmentation phase includes the segmentation text image into lines, word and characters. The final phase of recognition consists of feature extraction, selection and classification.[1] The Devanagari script consist of large number of characters and vowels. There are various issues other than this which make the recognition of handwritten characters a challenging task and affect the recognition rate to a considerable extent. There are various issues like Variations in the writing style of the writers, in case of compound characters the strategies for joining two or more consonants are different, Segmentation of modifiers, Segmentation of touching characters.

2. METHODOLOGY

In this experiment we have mainly focus on recognition of modifiers and joint characters. In segmentation of character we try to segment characters with modifiers. For this we have created a dataset of Devanagari characters with maximum possibilities of modifiers and with multiple combinations of joint characters. For feature extraction we have used gradient feature extraction technique and for classification we used SVM classifier to train and test the data.

2.1 Pre-processing

Pre-processing is the first step of OCR. The text document is generally scanned at 300 or 400 DPI. Pre-processing is also done to improve the accuracy of the recognition algorithm. Main steps in pre-processing are noise removal, binarization and skew correction. In this scanned document which is image is convert into binary image. For binarization Otsu method is used. In this a threshold value is selected and the intensity values which are above the threshold are converted into one intensity value and which are below the threshold are converted into zero intensity. The input image may contain noise. Noise is to be removed to process the image for further process. The input image is normalized at 50*50 to reduce computational time.

2.2 Segmentation

After the image is pre-processed using methods discussed above, we now apply various techniques for segmentation of document into lines, words and characters. Segmentation is an important primary task for any Optical Character Recognition (OCR) software. A big image of some written document is fragmented into a lines, words and characters respectively. The segmented character then used for pattern matching from trained database. For segmentation we have used projection profile method.

2.1.1. Line segmentation

The text lines are detected by horizontal projection profile method. In horizontal projection profile method sum of black pixel is horizontally calculated. The large values showed where the headline occurs. The text lines are segmented by finding the minimum projection profile height that is minimum value between two consecutive lines.

2.1.2. Word segmentation

The words from line are detected by vertical projection profile method. In vertical projection profile method sum of black pixel is vertically calculated. There is minimum value or large values shown where the headline occur. The text lines are segmented by finding the minimum projection profile height that is minimum value between two consecutive lines.

2.1.3. Character Segmentation

Character segmentation is done after the individual words are identified. To extract character from word removal of headline is essential. For this first horizontal projection of individual word is computed and the rows having highest projection is consider as a headline and removed for further character segmentation. The above portion of headline is stored for further use. After removal of header line vertical projections of individual word is computed. Using these profiles separation of the base characters is done. After separation of characters the saved portion of above the header line is put on individual character. This result gives us the characters with modifiers and joint characters also.

2.1.4. Feature Extraction

The gradient measures the magnitude and direction of the change in intensity in a small neighbourhood of each pixel. In future extraction, we used gradient feature extraction method. In this we extract the set of feature from the database characters. It is very important step in developing a classification system.[6]

$$G_x(x, y) = I(i+1, j-1) + 2 * I(i+1, j) + I(i+1, j+1) - I(i-1, j-1) - 2 * I(i-1, j) - I(i-1, j+1) \quad (1)$$

$$G_y(x, y) = I(i-1, j+1) + 2 * I(i, j+1) + I(i+1, j+1) - I(i-1, j-1) - 2 * I(i, j-1) - I(i+1, j-1) \quad (2)$$

The Gradient Strength and Direction can be computed from the Gradient Vector $[G_x, G_y]^T$ as shown below using Eq. (3) and (4):

The Gradient Magnitude is then calculated as:

$$|G(i, j)| = \sqrt{(G_x(i, j))^2 + (G_y(i, j))^2} \quad (3)$$

Gradient direction is calculated as:

$$\theta(i, j) = \tan^{-1} \{G_y(i, j) / G_x(i, j)\} \quad (4)$$

A Gradient Feature Vector is composed of the strength of gradient accumulated separately in different directions. The Gradient Feature Vector which we have used in our approach comprises of 200 features per image or in other words we can say that its dimensionality is 200. After obtaining gradient vector of each pixel, the gradient image is decomposed into four orientation planes or eight direction planes (chain code directions).

The Directional Feature Vector of each pixel is obtained by decomposing its Gradient Vector into components along the standard direction planes. If a gradient direction lies between two standard directions, it is decomposed into two components along those two directions resulting into generation of directional feature vector.

2.2. Classification

In classification the extracted feature of image is matched with database feature of character. We used Support Vector Machine (SVM). SVMs are mostly used to solve various real world problems of uncertainty in Data Based Systems. We used a multiclassifier of k classes to classify the input character image. About 85% recognition rate is achieved.[7]

3. RESULTS AND DISCUSSION

The handwriting segmentation system was run on many samples all gathered from different people selected randomly. The input for testing as it contains the joint characters is considers as a single character for recognition process. It results into recognition of joint character directly. Instead of separating two characters from joint one we treat it as a single character.

Table 1: Implemented Result

	No. of lines	No. of words	No. of characters
	4	9	40
Recognised	4	9	34
Accuracy	100%	100%	85%

4. CONCLUSION

We have presented a primary work for segmentation of lines, words and characters of Devnagari script. Nearly 90% successful segmentation achieved in line and word segmentation but character level segmentation needs more research and efforts as it is complicated for Devnagari script. This is challenging work due to following reasons.

- Compound letters or joint letters are connected at various places. It is difficult to identify exact connecting points for segmentation.
- Upper and lower modifier segmentation needs different approaches.
- Separating anuswara (.) and full stop (.) from noise is critical as both resemble the same.
- Handwritten unconnected compound letter segmentation is also critical.
- Handwritten unintentionally connected simple letter segmentation is also critical.

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Influence Of Gender And Locale On The Career Maturity Of Students In Degree Colleges

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Abstract

The college years denote a transition point from education to work. It is a crucial time for career-related decision making which is a function of career development and is measured in terms of Career Maturity (CM). A perusal of available literature shows that no studies have been done in Meghalaya on Career Maturity amongst the Arts Students in Degree Colleges where students are in the process of transiting to the world of work. Hence, the present study was taken up to fill this research gap. The Students in Arts Stream from four Degree Colleges of West Garo Hills District of Meghalaya were purposively selected as sample, with 60 Male and 60 Female Students from Urban and 60 Male and 60 Female Students from Rural areas. Career Maturity Inventory by Dr. Nirmala Gupta was used for collecting data. The data was analysed with the help of Two-Way ANOVA. The result showed no significant influence of Gender and no significant influence of interaction between Gender and Locale on CM of the Students. However, the Mean Scores showed that both Urban and Rural Males had slightly higher CM than the Urban and Rural Females. The influence of Locale on the CM of Students was found to be significant and that the Urban Students were found to have significantly higher level of CM than the Rural Students.

1. INTRODUCTION

The college years are a crucial time for career-related decision making (Ping, 2009). It denotes a transition point from education to work for many and from College level education to advanced education for some. The process of decision making at this

point of transition is nothing but a function of career development. Career development, just like the other facets of an individual's development is an important aspect of the developmental process. It is the process of managing life, learning and work over the lifespan (Walker, 2010) in a series of stages as conceived by Donald E. Super (1957) in his Career Development Theory. These stages, i.e. growth (birth to 14 years), exploration (15-24 years), establishment (25-44 years), maintenance (45-64 years) and decline (65+ years) are accompanied by a list of developmental tasks, such as, crystallisation, specification, implementation, stabilization and consolidation; and the 'degree' and 'rate' (Crites, 1973) to which a person successfully copes with these developmental tasks at each stage is measured in terms of 'Career Maturity.'

Career Maturity is defined as "the individual's readiness to make informed, age-appropriate career decisions and cope with career development tasks" (Savikas, 1999, as cited by Paton & Creed, 2003). Pickworth (1997) defines it as the individual's readiness to cope with the developmental tasks which he is confronted with because of his or her biological and social developments, as well as society's expectations of people who have reached that stage of development (cited by Mubiana, 2010). Building on Super's Theory, J.O Crites (1973, 78) developed a measure of Career Maturity which consists of two dimensions – cognitive and affective (Themba, 2010). The cognitive dimension includes career choice competencies which comprises of five kinds of competencies – self appraisal, occupational information, goal selection, planning and problem solving. On the other hand, the affective dimension includes five attitudinal dimensions – involvement in choice process, orientation towards work, decisiveness, independence in decision making and compromising tendencies.

Career Maturity (CM), in the present study, is defined as the cognitive and affective behaviour of individuals which indicates their readiness to make informed career decisions at appropriate stages of career development..

2. REVIEW OF RELATED LITERATURE

All available studies on CM done in India were reviewed. It was found that studies pertaining to Gender show inconclusive results. Kaur & Dogra (2011) and Sirohi (2013) found that Female students had higher level of Career Maturity than Male students. Mathur & Sharma (2001) and Singh & Sukhla (2015) found that Male students were more Career Mature than Female students. While Bhatnagar & Gupta (1988) and Kaur (1992) found no significant differences in the Career Maturity of Male and Female students as reviewed by Bhatnagar (1992). Pertaining to Locale, Alam (2013) found that Urban boys and girls were more career mature than Rural boys and girls. Through a perusal of available literature it was found that no studies have been done in Meghalaya on Career Maturity amongst the Arts Students in Degree Colleges. Hence, this study attempts to fill this research gap with the anticipation that the findings would significantly contribute to understanding the career behavior of the youth in Meghalaya.

3. RATIONALE OF THE STUDY

Undergraduates are the future knowledge workers of the economy. Since there is a positive relationship between enrolment in tertiary education rates and economic growth (Keller, 2006; cited by Holland et al, 2013), the career development needs of the undergraduates have to be understood and nurtured. As cited by Naidoo (1998) in his review, Career Maturity has become a well-established concept and is central to many career counselling and education programmes in schools and colleges (Herr and Cramers, 1984) and to many career development programmes in business, industry and government (Hall, 1984). Given the significance of the construct in understanding the career behaviour of individuals, there exists a research gap in the country and the state, especially at the tertiary level where students are in the process of transiting to the world of work. Hence, the basic aim with which this study is undertaken is to find out the career readiness of the Students in Degree Colleges in the Arts Stream of West Garo Hills District of Meghalaya, who are in the exploration stage of career development.

4. OBJECTIVES

The study was carried out with the following objectives:

- To study the influence of Gender on CM of Students in Degree Colleges in Arts Stream.
- To study the influence of Locale on CM of Students in Degree Colleges in Arts Stream.
- To study the influence of interaction between Gender and Locale on the CM of Students in Degree Colleges in Arts Stream.

5. HYPOTHESES

On the basis of the above objectives, the following H_0 were formulated:

- There is no significant influence of Gender on CM of Students in Degree Colleges in Arts Stream.
- There is no significant influence of Locale on CM of Students in Degree Colleges in Arts Stream.
- There is no significant influence of interaction between Gender and Locale on the CM of Students in Degree Colleges in Arts Stream.

6. SAMPLE

Of the seven Degree Colleges in West Garo Hills District of Meghalaya, four Degree Colleges affiliated to the North Eastern Hill University, Shillong, were chosen for the study. The sample was further delimited to students in the Arts stream only. A total of 240 Degree Students (120 Males/ 120 Females) studying in Arts Stream were purposively selected as Sample comprising of 60 Males and 60 Females from Urban area and 60 Males and 60 Females from Rural area. The detail of the Sample is given in Table 1.

Table 1: Distribution of the Sample in the Arts Stream

Locale	Name of the College	Gender		Total
		Male	Female	
Urban	Don Bosco College	30	30	60

Urban	Durama College	30	30	60
Rural	Phukan Memorial College	30	30	60
Rural	Nongrum College	30	30	60
Total		120	120	240

7. TOOLS AND TECHNIQUES

Career Maturity Inventory (CMI_GN) by Nirmala Gupta (1989) was used for collecting data. This inventory is an Indian adaptation of the CMI developed by J.O Crites in 1973 which was later modified in 1978. The tool comprises of two sub tests – Attitude Scale and Competence Test. The normal distribution of the scores was checked by using SPSS Version 20. It was found that the data were approximately normally distributed for both Gender and Locale with a skewness of .003 (SE = .221) and a kurtosis of -.696 (SE = .438) for Urban and Rural Males, and a skewness of -.232 (SE = .221) and a kurtosis of -.605 (SE = .430) for Urban and Rural Females (Lofgren, 2013).

8. RESULT AND FINDINGS

As per the objectives of the study, there were two levels of Gender, i.e. Male and Female, and two levels of Locale, i.e. Rural and Urban. So, the data was analysed with the help of 2 x 2 Factorial Design ANOVA in SPSS. The result of the analysis is presented in Table 2.

Table 2: Summary of 2 x 2 Factorial Design ANOVA of CM

Source	df	SS	MSS	F-Value	Remarks
Gender (A)	1	238.0	238.0	1.72	p < 0.01
Locale (B)	1	15600.94	15600.94	112.87	
A x B	1	9.20	9.20	.067	
Error	236	32620.15	138.22		
Total	239				

It is evident from Table 2 that the F-Value for Gender is 1.72, which is not significant. This indicates that the Mean Scores of CM of Male and Female Students did not differ significantly, and so, there was no significant influence of Gender on CM of the Students in Degree Colleges in Arts Stream. Thus, the first H_0 that, there is no significant influence of Gender on CM of Students in Degree Colleges in Arts Stream is not rejected. It may, therefore, be said that the CM of the Students were found to be of the same extent in terms of Gender.

However, as can be seen in Table 2, the F-Value for Locale is 112.87 which is significant at 0.01 level with df = 1/239. It indicates that the Mean Scores of CM for Urban and Rural Students differ significantly. This means that there was a significant influence of Locale on CM of the Students. Thus, the second H_0 that there is no significant influence of Locale on CM of Students in Degree Colleges in Arts Stream is rejected. This, therefore, reveals that the Urban and Rural Students differ significantly in their CM.

Again, from the same Table, it can be seen that the F-Value for Gender and Locale is .067 which is not significant. This means that the Mean Scores on CM of Male and

Female Students from Urban and Rural areas did not differ significantly, and so, there was no significant influence of interaction between Gender and Locale on CM of Students. Thus, the third H_0 that there is no significant influence of interaction between Gender and Locale on CM of Students in Degree Colleges in Arts Stream is not rejected. Therefore, it can be said that the CM of Students were found to be independent of interaction between Gender and Locale.

Table 3: Gender & Locale wise N, Mean, SE & Percentile of CM of Students

Gender	Locale	N	Mean	SE	Percentile
Male	Urban	60	55.18	13.17	30 th
	Rural	60	39.45	12.75	21 st
	Total	120	47.32	15.13	
Female	Urban	60	53.58	12.28	29 th
	Rural	60	37.07	08.12	20 th
	Total	120	45.32	13.27	
Total	Urban	120	54.38	12.71	
	Rural	120	38.26	10.71	
	Total	240	46.32	14.24	

Further, from Table 3, it can be seen that the Mean Scores of CM of Urban and Rural Males, which is 47.32, is slightly higher than those of Urban and Rural Females, whose Mean score is 45.32. This means that the Males were relatively more CM than the Females in Urban and Rural areas. Also, the Mean scores of CM of Urban Males and Females, which is 54.38, is significantly higher than those of Rural Males and Females, whose Mean Score is 38.26. This means that the students in the Urban area have significantly higher CM than the students in the Rural area.

Table 3 also shows that the scores of CM lies in the 30th percentile for Urban Males, 21st percentile for Rural Males, 29th percentile for Urban Females and 20th percentile for Rural Females. According to Crites (1978), scores below the 50th percentile are indicative of the potential for delayed or impaired progress related to career decision-making (Rojewski, Wicklein & Schell, 1995). Since the scores of CM of Males and Females in Urban and Rural areas lie below the 50th percentile, it can be inferred that majority of the students do not have adequate level of CM as per their career development stage, but have delayed or impaired level of CM. In other words, the Students in Degree Colleges in Arts Stream of West Garo Hills District of Meghalaya show insufficient maturity in their career development and are not adequately ready to transit to the world of work.

9. DISCUSSION

The result of the study is in conformity with the findings by Bhatnagar & Gupta (1988) and Kaur (1992) who found no significant difference in the CM between Males and Females; and with the study by Alam (2013) who found that Urban boys and girls were more Career Mature than Rural boys and girls. A possible explanation for finding no Gender difference in CM in the present study could be the matrilineal structure of the

society in the region where women assume an important role and where they face less discrimination in getting education and employment (Momin, 2007). Though no significant differences were found in the CM of Male and Female Students, we cannot ignore the fact that significant difference exists between Urban and Rural Students and that majority of the students have delayed or impaired levels of CM. There may be several possible explanations for this as viewed from the personal, societal and institutional levels.

At the Personal Level:

- Most students enter higher education without a definite plan for the future. They are not aware of the fast changing world of work. The changes in the social arrangement of work in the 21st century requires workers to develop skills and competencies that differ substantially from the knowledge and abilities required by 20th century occupations (Savikas et al, 2009), and most students in the Degree Colleges in the Arts Stream do not possess the required skills and competency.
- They lack motivation and therefore are not highly competent in terms of career development.
- Most students do not have access to career information.
- Since the State Government is the largest employing agency, most students aspire for government jobs either in the education sector or in the administration.
- Most students are reluctant to explore newer options available in the world of work.

At the Institutional Level:

- The curriculum is such that it does not nurture the career development of the students.
- No Career Guidance and placement cells are available, and if available, are not functional in the colleges.
- No job-specific degree courses are provided in colleges other than traditional courses.
- There is huge enrolment in Arts stream as illustrated in Figure 1. In case of West Garo Hills, Arts, Science and Commerce courses are provided only in two colleges, while the other five colleges provide only Arts course. The enrolment of the students in Arts Stream is more than the intake capacity of these colleges. Two colleges in the District have double shifts to accommodate more students enrolling in Arts stream.

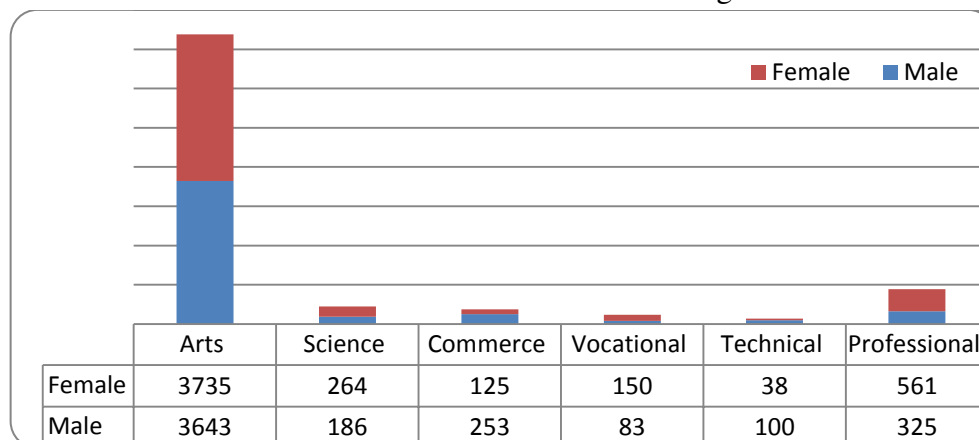


Figure 1: Distribution of Students in Different Streams

Source: Enrolment data (2015-16) collected from the colleges and institutes of West Garo Hills District

At the Societal Level

- Since Vocational Education is considered a stigma in India, this may also be assumed to be true in Meghalaya, which explains why there is huge enrolment in the Arts stream.
- In terms of access, Meghalaya has only sixteen colleges which is below the national average of twenty three colleges per lakh population according to a report by Deloitte (Akula, 2015). This explains why enrolment of students exceeds the intake capacity.
- The recently initiated Chief Minister's Career Guidance programme is not reaching all stakeholders, especially at the college level in both Urban and Rural areas.
- No major transformation has been observed in the functions of Employment Exchange run by the Government as per the current demands of the labour market.

10. SUGGESTIONS

The 21st century work environment is dynamic. Hence, skilling the youth in terms of employment and career would ensure their Career Maturity which is directly linked to workforce productivity. Meghalaya has India's largest and fastest growing youth population (Meghalaya State youth Policy, 2012). Therefore, preparing the youth for future challenges, especially in the world of work, is of paramount importance. With recent emphasis being placed on skill development especially at the Vocational level, Higher Education should not be isolated. As per the National Policy on Education (PoA, 1992), Higher Education contributes to national development through dissemination of specialized knowledge and skills. Therefore, the career development of the students in Degree Colleges needs to be ensured by equipping them with updated knowledge and employability skills relevant to changing needs of the economy. The following suggestions are made to cater to the observed and felt career development needs of the undergraduates in Meghalaya:

- Career guidance programmes should be organized at the College level. These programmes will provide awareness and information on career related interventions and help the Students to make appropriate career choices.
- More colleges, especially in the rural areas should be established offering not just the conventional courses of Arts, Science and Commerce but also other non-conventional courses.
- The curriculum should include skill development courses which would train the undergraduates in facing interview boards, writing resume, seeking jobs, maintaining inter-personal relationship, learning about job duties and responsibilities and the like.
- Subject teachers should be sensitized towards the career development needs of the students. They should be trained in order to facilitate Career Education through their teachings.
- Career counsellors should be appointed in the Colleges to cater to the career development needs of the undergraduates.

- The state should create more employment opportunities, especially for the university graduates.
- The functions of Employment Exchanges should be redefined. It should be able to provide up-to-date web-based career information to the students as well as monthly or quarterly circulars on career information to schools and colleges.

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Enhancing The Performance Of The Heat Exchanger With Experiments Over The Variants Of Spiral-Shaped Channel

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Spiral Channel, Insert, Heat Transfer, Mathematical Model, Tube-In-Tube, Aluminum, Copper, Brass

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Abstract

The work takes up the cause of heat dissipation from the working fluid to its surroundings. This is being brought about through the enhancement of the rate of heat transfer while allowing the working fluid to pass through a channel in a spiral form effected with a metal insert. Since the fluid is made to contact a larger surface area during its passage from the tube, the rate of heat transfer gets higher than a plain tube. Mathematical model is built to analyze the heat transfer while varying the Pitch of the spiral channel as also the Material of the insert. Experimentation is carried out using a physical working setup. The results are compared for validation. The dissertation work aims to find out the best alternative in terms of material and geometry of the spiral channel that would maximize the rate of heat transfer from the working fluid to the secondary fluid.

1. INTRODUCTION

Thermal performance improvement of many heat exchanger systems utilized in engineering and industrial work is needed for energy saving and reduction of operating cost. Heat transfer augmentation methods are often used in the heat exchanger systems in order to enhance the heat transfer rate and increase the thermal performance. In general, a turbulent promoter (called "turbulators") which is one of the passive methods is widely employed in heat transfer enhancement in the form of swirl/vortex flow devices such as rib/fin/baffle/winglet/propeller/groove-roughened surfaces. Several types of turbulators inserted into the duct flow are to provide an interruption of thermal boundary layer development, to increase the heat transfer surface area and to cause enhancement of heat transfer by increasing turbulence intensity or fast fluid mixing. Therefore, more compact and economic heat exchanger systems with lower operation cost can be obtained. Many attempts have been made to examine the application of various tabulators with different configurations to heat transfer improvement in the heated tube of heat exchanger, for example wire-coils, twisted-tapes, combined/compound tabulators, dimpled/ corrugated/ grooved tubes.

Several modified twisted tapes have been extensively studied by focusing on the rise in heat transfer rather than the reduction of pressure drop. Because of lower pressure loss, the heat transfer enhancement by the modified twisted-tape insert has been extensively investigated. The present investigation is aimed at studying the frictional and heat transfer characteristics in turbulent region using varying pitch of twisted tape inserts under constant wall heat flux. The objective of using varying pitch twisted tapes is to reduce the pressure drops associated with alternative material and pitch of the twisted tapes without seriously impairing the heat transfer augmentation rates.

2. LITERATURE REVIEW

[1] M.Yilmaz et al. investigated the heat transfer and enhancement efficiency characteristics of decaying swirl flow generated by three radial guide-vane swirl generators viz. swirl generator with conical deflecting element, with spherical deflecting element and with no deflecting element. Air is used as a working medium. Experimentation is carried out using a physical working setup. In this experiment, five inlet swirl conditions were selected which were generated by setting the guide vane angles at 15°, 30°, 45°, 60° and 75°. The Reynolds number of air ranged from 32,000 to 111,000. Some energy correlation equations and heat transfer enhancement efficiency correlation are taken from the table present in research paper. It is observed that, the increase in vane angle increased the heat transfer coefficient. Also, heat transfer coefficient increased with increasing energy dissipation parameter. Moreover, enhancement efficiencies increased with decreasing Reynolds number and increasing vane angle. Swirl generator with no deflecting element was found to have the highest heat transfer enhancement efficiency compared with other two swirl generators.

[2] M.M. Abu-Khader investigated the characteristics and performance of twisted tapes imposed at various flow rewash regimes. An industrial case study was selected from the open literature to evaluate heat transfer enhancement. Ethylene glycol is used as a cooling medium and the heating medium is low pressure steam condensing at 115°C in a horizontal tube heat exchanger. After examining all the three flow regions closely it is observed that at the laminar region, using large tube diameter, the twist ratio has approximately no effect on local heat transfer coefficient. On the other hand, when decreasing the inside tube diameter the effect of twist ratio appears significantly and the local heat transfer coefficient rises sharply. This is due to the decrease in the twist pitch. Even though decreasing the tube diameter seems to be in favour of enhancing the local heat transfer but the sharp rise in the pressure drop should be taken into consideration. After studying the literature we came to conclusion that the tube insert technology is more effective in laminar region. When designing for various flow-rates and pressure drop was not taken into consideration, using tube with twisted tape will be cheaper in terms of overall cost. As the twist ratio increases both the local heat transfer coefficient and the friction factor decreases.

[3] A.Klaczak presents the results of laboratory research on heat exchange while heating water in horizontal and vertical tubes with twisted-tape inserts in laminar flow conditions within certain range. The method of direct measurement of test tube wall temperature is used to calculate the mean heat transfer internal heat transfer coefficient experimentally. The boundary conditions are limited to uniform axial wall temperature. Water is used as a working medium. Turbulators or twisted tape are made up of copper were put snug in the test tube with varying twist ratios. The tests were taken for three cases viz.. horizontal test tube; vertical test tube, the direction of flow according to the free convection vector; and vertical test tube, the direction of flow not in accordance with the free convection vector. To present all the results, a tool dispersion of measuring points is used to analyze the heat transfer between the liquid and inner side of test tube. The research showed the heat transfer intensity has different characteristics in each case. For slow flows and twist ratio 1.6, the results obtained for the cases 1 and 3 are most convenient. For flows at $Gz=500$, the most favorable is the case 2 while the case 1 is less favourable. It is observed that the best results were received using the twisted tape with twist ratio of 1.62. Constructing heat exchangers with vertical pipes at $Re \leq 1500$ it is better to use case 3. When $Re \geq 1500$ case 2 gives slightly better results. There was about 200% increase in heat transfer in relation to a smooth tube.

[4] M.A.Habib et al. investigated experimentally the heat transfer characteristics of pulsated turbulent pipe under different conditions of pulsation frequency, amplitude and Reynolds number. Air as a working fluid is pumped by an air blower near atmospheric pressure and is discharged to the atmosphere through the test section after being heated by insulated heating taped equally wound throughout the length of test section pipe. The flow is considered to be incompressible and the fluid properties assumed to be constant so that, the effect of pulsation on average heat transfer coefficient is the combined entrance and

fully developed regions of a turbulent pulsating pipe flow. Flow Reynolds number was varied between 5032 and 28,984 while pulsation frequency ranged from 1 Hz to 8 Hz. The amplitude of induced pulsation varied between 0.0127 to 0.0381 m. Pulsating mechanisms is used as a four bar slider crank mechanism. It is observed that the increase in heat transfer coefficient is noticeable in the entrance region than in the fully developed region. Overall reduction on the mean Nusselt number was ascertained for the whole Reynolds number with maximum reduction of about 13%. However, local heat transfer enhancement did occur in the entrance region for Reynolds number of 5032 at frequency ranges of 2 Hz to 6 Hz. The results reveal negligible effect on pulsation frequency on the mean Nusselt number at low Reynolds number.

[5] P. C. Mukeshkumar et al. investigated the heat transfer and pressure drop analysis of a shell and helically coiled tube heat exchanger under turbulent flow regime using Al₂O₃/water nanofluid with varying particle volume concentration processed by using two step methods. The particle volume concentration was made to get the tiny agglomeration of Al₂O₃nanoparticles and water as base fluid. The experimental setup consists of shell side loop carries hot water and helical coiled tube loop handles Al₂O₃/water nanofluid contains counter flow configuration. Nano fluid at 0.1%, 0.4% and 0.8% volume concentration is circulated through the tube side. The tests were conducted in the range of Reynolds number 9500-13,000. Flow rate is in the range of 0.05 to 0.07 kg/sec. Critical Reynolds number, overall heat transfer coefficient and inner heat transfer coefficient of coiled tube are calculated from basic empirical equations. From this experiment, it is found that pronounced improvement in overall heat transfer coefficient, inner heat transfer coefficient and inner Nusselt number higher than water at 0.8% volume concentration. These are due to higher thermal conductivity of fluid due to agglomeration which carries more heat energy. Further, it is also noticed that the pressure drop is higher than water at 0.8% concentration at maximum Reynolds number.

[6] S.V Patil et al. conducted an experiment for plain square duct with twisted tape inserts of different twist ratio to the heat transfer characteristics and friction factor at uniform wall temperature boundary conditions. The test is conducted in a double-pipe heat exchanger consists of two concentric tubes; inside square duct for cold water flow made up of copper and outside circular stainless steel annulus. A full length twisted tapes used with different twist ratios are inserted diagonally in a square duct. A constant flow rate of hot water is permitted to flow through annular channel. It is observed that the friction factor increases with decreasing twist ratio and decreases abruptly with increasing Reynolds number. This is due to smaller twist ratio generates high swirling flow and flow velocity. Nusselt number of plain duct increases with increasing Reynolds number showing an enhanced heat transfer coefficient due to forced convection. The empirical correlations for friction factor and Nusselt number are generated by using non-linear regression analysis. Thermo hydraulic performance ratios R1 and R3 for constant flow rate and constant pumping power respectively. R1 increases with increasing augmented Reynolds number of 2140 for all twisted inserts. R3 increases with increasing augmented

Reynolds number of 1050 for all twisted tapes. The performance ratio decreases sharply as Reynolds number increases beyond 1050.

3. PROBLEM DEFINITION

There are scores of applications that mandate a high rate of heat transfer within the system elements either to heat or cool the working fluid in the minimum time possible. While doing so, the pressure drop is desired to be kept low (minimum). The pressure observed for the benchmark i.e. the plain tube, could be used for reference. The drop in this pressure may not fall below 20% of the benchmark while gaining or losing heat of about 3% based on the application or the problem area identified for the dissertation work. For a typical application for a 'Radiator' in an Automotive, the heat is lost by exposing the tubular channels to the environment. The air that flows over the tubes, pick up the heat and eventually cools down the tube. Besides other factors, for a given configuration, the performance is based on the 'Mass flow rate' of the working fluid and the flow of the atmospheric air around the tube.

Further to this typical study, the work should focus on using fluid with higher latent heat than air. Water could be used as an alternative for cooling while allowing the same to flow around the working medium using tube-in-tube type of construction. Higher rate of heat transfer is expected in this case. The problem for realizing increased rate of heat transfer could be considered with the introduction of spiral insert while varying the pitch of the test samples. The material of the insert could have alternatives like Copper, Aluminium or Brass. The configuration for the test pieces could have smaller, medium, and higher Pitch between the turns of the spiral insert. A suitable Reynolds number could be considered for determining the diameter and length of the tube in which the insert is to be placed.

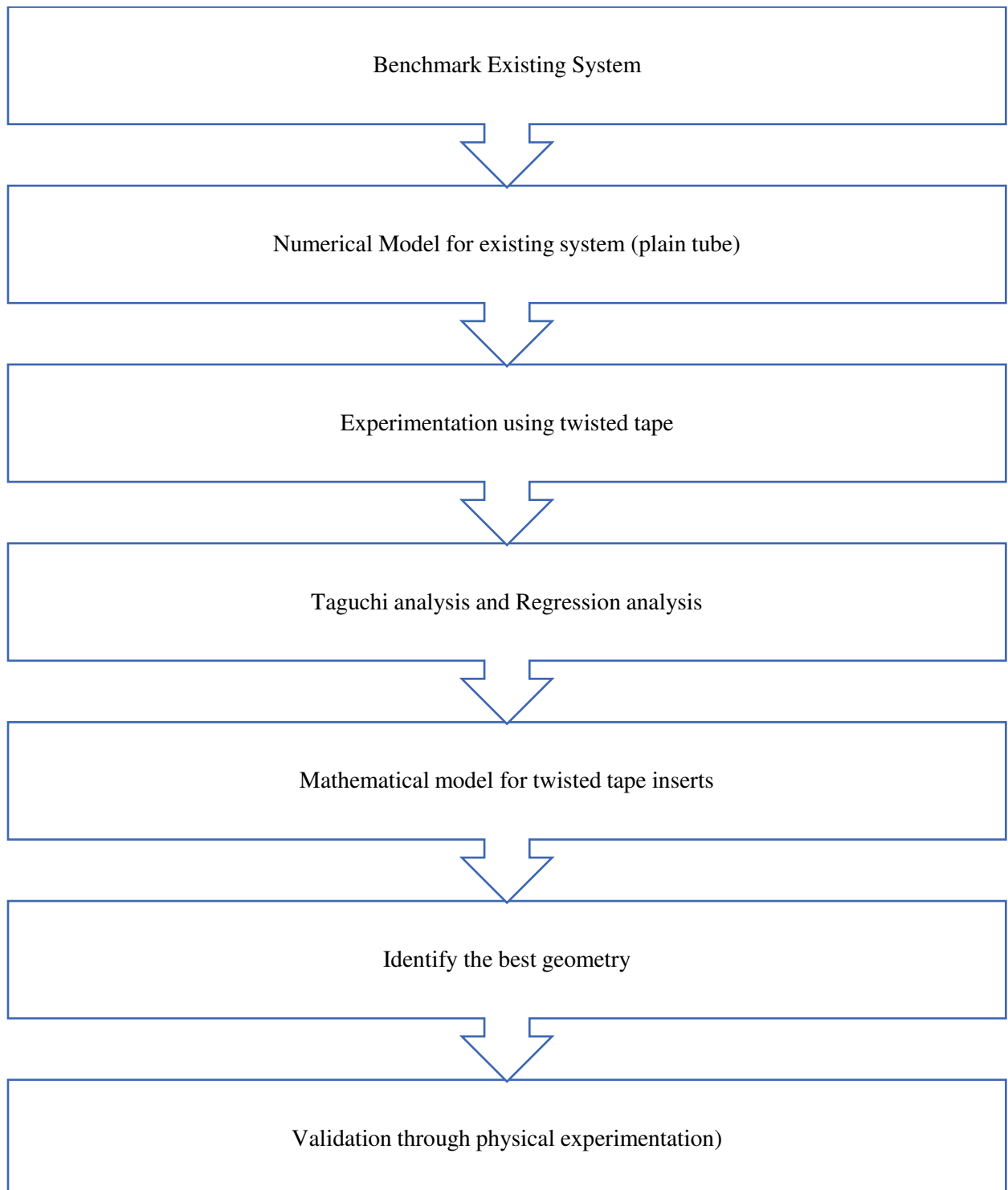
3. SCOPE AND OBJECTIVE

- i.) Study the existing system for heat transfer.
- ii.) Identify the parameters contributing more in heat transfer rate and classify them into two categories as input and response parameters.
- iii.) Identify the levels of different parameters to study the Statistical method such as Taguchi and Regression analysis
- iv.) Experimentation based on combinations of different input parameters
- v.) Taguchi and Regression analysis using MiniTab interface.
- vi.) Mathematical calculations
- vii.) Validation and recommendation of best variant

4. METHODOLOGY

- **Mathematical Calculations:** As per experimental details mathematically pressure drop and heat enhancement would be calculated using standard empirical formulae.

- **Statistical method:** In this method, Minitab interface would be used for statistical analysis. Taguchi , ANOVA and Regression analysis methods would be deployed for the heat enhancement study

Flow chart for Methodology

5. Experimentation

The apparatus would consist of a tube-in-tube type concentric tube heat exchanger. The hot fluid shall be hot water which would obtain from an electric geyser and it will flows through the inner tube while the cold fluid shall be cold water flowing through the annulus. The hot water shall flows in one direction and the flow rate of which will be controlled by means of a valves. The cold water could be admitted at one of the end enabling the heat exchanger to run as a parallel-flow apparatus or a counter-flow apparatus.

The main objective of this experiment is to study is:

- i.) Temperature distribution in parallel-flow and counter-flow heat exchanger without insert and with insert as twisted tape.
- ii.) Heat transfer rate using plain tube and twisted tape of different pitch and material.
- iii.) Overall heat transfer coefficient
- iv.) To obtain the effectiveness of the given heat exchangers using different configuration of twisted tape

The experiments shall be conducted by keeping the identical flow rate while running the unit as a counter flow. The temperature shall be measured by mercury in glass thermometer and the flow rates by a graduated measuring flask and stop watch.

The readings would be recorded when steady state will reach. The outer tube would be provided with adequate thermo Cole insulation to minimize the heat losses.

6. CONCLUSION

For the validation, results derived from two differing methodologies are compared. In this thesis, computational and/or numerical and/or experimental results would be validated through comparison. On the basis of experimentation, the variant with suitable geometry in terms of pitch and the material of the spiral tape shall be proposed.

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Fatigue Life Optimizations Of SUV Front Suspension Mount

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Abstract

In simple terms, a rubber-to-metal component is a vulcanized rubber block bonded to metal (or plastic), used to join components or structures that must be isolated from noise and vibration. In practice, reaching an effective compromise between durability, safety and comfort when designing each RTM component to suit a specific vehicle model and purpose involves many complex considerations. This leads to unique rubber/additive recipes and product designs to tune dynamic properties while also meeting requirements such as high fatigue strength, resistance to ageing, temperature resistance and recyclability. In addition, vehicle safety systems such as anti-lock braking and traction control can only function perfectly if all suspension components are in faultless condition. Wear in the strut mounts May leads to increased vibration, longer braking distances, or stiff/non-self-centering steering, symptoms that usually develop gradually and go unnoticed by the vehicle owner until a knocking noise prompts investigation [10]. Where possible without dismantling, visual inspection may reveal folds or cracks in the surface of the rubber (see pic, below) or the rubber detaching from the metal. They also create higher loads on new shock absorbers and other suspension components such as drop links, which then wear more rapidly. Therefore motivation for this research is to increase fatigue life of rubber isolator so that there is increase in the life of strut mount of Honda CRV SUV (model no: EX-L 4WD).

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3927

1. INTRODUCTION

MacPherson suspension system: It is true that the average member of the vehicle owning public is unaware of the range of duties performed by a vehicle suspension. Certainly many would recognize the importance of the suspension for ride, but fewer would identify its importance in the handling of a vehicle. In reality a vehicle suspension is required to perform effectively under a range of operating conditions including high levels of braking and accelerating, cornering at speed and traversing rough terrain – manoeuvres which are required to be done in comfort and with safety. It is very important to study the vehicle suspension system Design and its fatigue life. Suspension system consists of the different suspension components and there are also different suspension systems. MacPherson suspension is one of the most popular type of Independent suspension system MacPherson strut suspensions started appearing on cars back in the late 1970s as an alternative to the traditional short long arm suspension. When Dodge introduced the front-wheel drive minivan in 1984, it also was fitted with MacPherson struts up front.

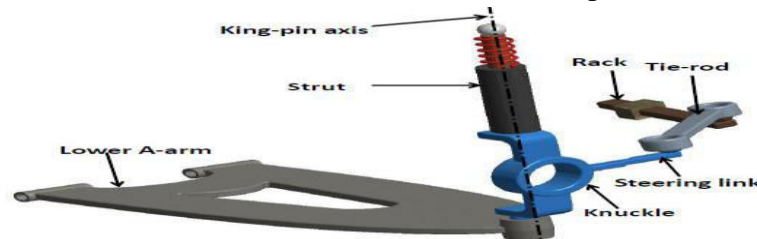


Figure 1: MacPherson suspension system

2. THE ROLE OF A VEHICLE SUSPENSION

- I. To provide good ride and handling performance – this requires the suspension to have vertical compliance providing chassis isolation and ensuring that the wheels follow the road profile with very little tyre load fluctuation;
- II. To ensure that steering control is maintained during manoeuvring – this requires the wheels to be maintained in the proper positional attitude with respect to the road surface;
- III. To ensure that the vehicle responds favourable to control forces produced by the tyres as a result of longitudinal braking and accelerating forces, lateral cornering forces and braking and accelerating torques – this requires the suspension geometry to be designed to resist squat, dive and roll of the vehicle body;
- IV. To provide isolation from high frequency vibration arising from tyre excitation. This requires appropriate isolation in the suspension joints to prevent the transmission of Road noise' to the vehicle body. It will be seen that these requirements are virtually impossible to achieve simultaneously, leading to design compromises with less than ideal performance.

3. RELEVANCE

A strut mount is one of the most important parts of our vehicle's suspension system. The strut mount serves as the mounting point for the top of our vehicle's strut assemblies to

connect to vehicle's chassis. MacPherson strut suspensions started appearing on cars back in the late 1970s as an alternative to the traditional short long arm suspension. Struts were first used on import cars, followed by small domestic front-wheel drive cars like the Ford Escort, Dodge Omni and GM X-cars. When Dodge introduced the front-wheel drive minivan in 1984, it also was fitted with MacPherson struts up front. Today, we will find struts used on a wide variety of vehicles, including passenger cars, crossover SUVs and even some full-size SUVs and pickup trucks. The strut was invented by Earl MacPherson (thus the name given to the component). Replacing the upper control arm, ball joint, shock absorber and coil spring with a strut assembly simplifies the front suspension. The shock dampening elements inside the strut housing provide the ride control function of an oversized shock absorber. A strut mount is like sandwich. One side bolts to the vehicle and the other side is to strut and in the middle there is rubber like insulating material called as rubber isolator its function is to dampen suspension noise and vibration. This leads to product designs to tune dynamic properties while also meeting requirements such as high fatigue strength, resistance to ageing, temperature resistance and recyclability. Worn top mounts impair ride comfort, generating noise and transmitting vibrations into the vehicle interior. They also create higher loads on new shock absorbers and other suspension components then wear more rapidly. Faulty components create symptoms like increased vibration, longer braking distances, or stiff/non-self-centring steering. The failure of rubber isolator shows folds or cracks in the surface of the rubber (see pic, below) or the rubber detaching from the metal. So, main objective of this research is to enhance the fatigue life of the rubber isolator of strut mount of Honda CRV with the help of material optimization.

4. LITERATURE REVIEW

- i.) **J.R Cho et al.(2015),[1]** In this domain the fatigue life of the fabric braided composite rubber hose in complicated large deformation cyclic motion is investigated. Because less fatigue life tends to the problems like micro cracks in braking hose which leads to oil leakage .This paper intend to introduce a numerical method for predicting fatigue life of braking hose in the lamination structure composed of pure rubber and fabric braided layer with three different models .The ϵ -N curve of the inner and outer rubber were obtained by the curve fitting of the experimental data which were made by in house fatigue testing using rubber specimens The validity of proposed numerical method is illustrated numerically and comparison is done with different models.
- ii.) **J.-H. Kim, H.-Y. Jeong (2005),[2]** In this paper the author has studied the effect of carbon enforcement in rubber on its fatigue life, hysteresis, fracture surface morphology and optical J value. Here N330, N650, N990 were investigated experimentally. Hysteresis was calculated by loading and unloading curves obtained during the fatigue testing. After the fatigue test, the obtained surface finish was investigated with the help of surface finish tester .The J value is also calculated experimentally by conducting the tensile test on the specimen From this research the

author come to know that all the four properties were ranked in the following order N330, N990, N650 and from this research it is also proved that logarithmic value of fatigue life is varies directly to square root of product of critical J values.

- iii.) **C.-S. Woo et al.(2009),[3]**The fatigue life evaluation and prediction is one of the important tasks according to safety and reliability is concerned. In this paper the author has studied the effect of ambient temperature on the fatigue life of the vulcanised rubber. The finite element analysis is performed for the both ambient and 70 degree Celsius conditions. The green Lagrangian strains were determined at the critical locations. The model is tested experimentally with the help of dump bell shaped vulcanised rubber specimen and it is found that predicted fatigue lives of rubber components mates with experimental results with the factor of 2.
- iv.) **F. Rauscher (2013), [4]**have done Fatigue analysis of the non-welded pressure vessels which made up of high strength steel is carried out .In case of welded connections stability of the pressure vessels greatly affected in case of moment loading and tend to buckle because of rigid nature. The sophisticated fatigue analysis and testing method is applied to meet the problem of cyclic fatigue .Because of using same wall thickness of high strength steel range the testing is done with standard hydraulic accumulator with the threaded end .This problem of fatigue failure was analysed by reducing the one side wall thickness and higher stress amplitude.
- v.) **D. Colombo et al.(2009),[5]** In this domain the author investigated the cause of premature failure of the upper strut mount of the McPhersons suspension. Here both experimental and numerical analysis has been carried out to estimate the service life of the component. The defect tolerance analysis has been carried out to find out whether there are chances of failure of components. The analysis shows that there are non-propagating cracks present in the components, So there is no danger of fatigue failure of components. The main cause of failure is impulsive load that can be justified by the static and dynamic loads acting on the components.

4. OBJECTIVES:

- Study the suspension system
- Study the material properties and Load and boundary condition applied to the suspension mount strut
- FE modeling of the assembly using Pre-processor
- Explicit analysis for the rubber component
- Result interpretation using Hyper View Interface
- Fatigue life prediction using Fatigue analysis software such as FEMFAT
- Re-analysis for the alternative rubber material
- Experimentation & Validation for the benchmark material

5. METHODOLOGY

5.1 Mathematical Calculation:

Forces acting on the assembly are calculated using mathematical imperial formulae.

- **Force Calculations:**

Load due speed of the vehicle

Consider Speed of the vehicle as 80 km/hr

Kinetic Energy is calculated by,

$$KE = \frac{1}{2} MV^2$$

$$KE = \frac{1}{2} * 1875 * 22.22^2$$

Work Done=Kinetic Energy= 462870.38 J

Static friction between good tires and a good road surface $\mu=0.8$

Stopping distance –

$$d = \frac{V^2}{2 * \mu * g}$$

$$d = \frac{22.22^2}{2 * 0.8 * 9.81}$$

$$d = 31.46 \text{ m}$$

$W = F_b * d$

$462870.38 = F_b * 31.46$

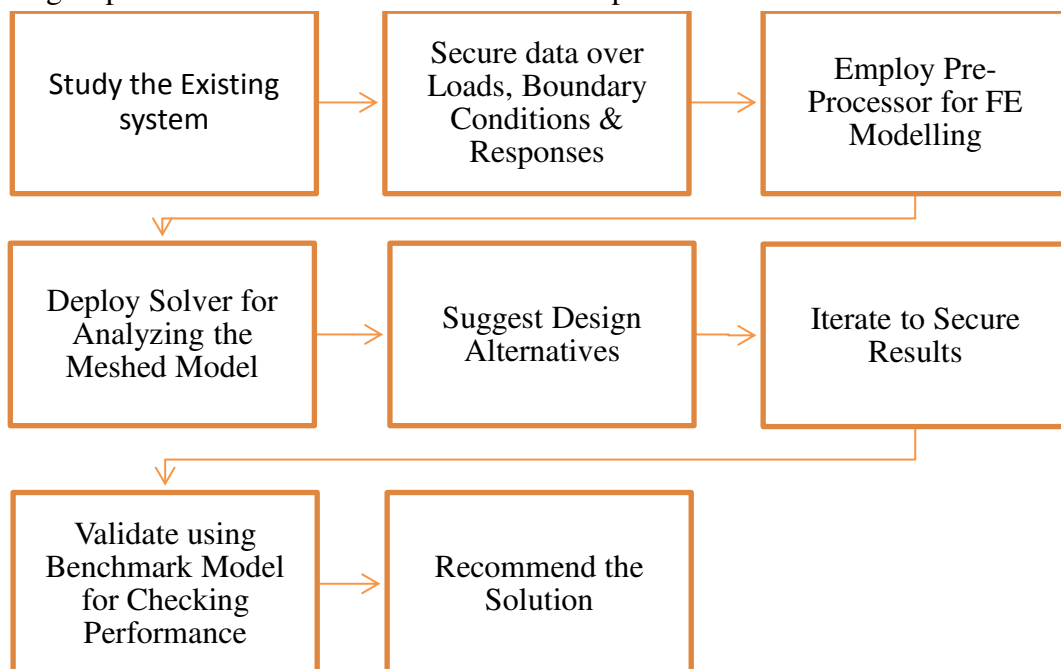
$F_b = 14712.98 \text{ N}$

Load shared by each wheel

$F_b = 3678.25 \text{ N}$

5.2 Analytical Method

Following steps will be used for the execution of the present dissertation work.



6. EXPERIMENTATION & VALIDATION

The process of validation for this method is sought through the physical Experimentation. The results of Experimental work considering fatigue life cycle for the existing case study shall be compared for results with the numerical methodology. The concurrence of the results shall offer validation for this thesis work.

7. CONCLUSION

The strut mount job is to reduce noise, vibration that could transmit to vehicle and forces generated due to uneven road surface. There is frequent aging or wearing of the rubber like insulating material called rubber isolator which is sandwiched between two parts of the strut mount. The motivation for this research is needs to increase fatigue life of rubber isolator so that there is increase in the life of strut mount of Honda CRV.

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Evaluating The Strength Of Suspension Arm In The Passenger Car Segment Using Computational Methodology

Paper ID	IJIFR/V3/ E10/ 038	Page No.	3934-3942	Subject Area	Mechanical Engineering
KeyWords	Automotive, Hyper works, Suspension Arm, Structural Analysis, Static Loads, Shock				

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Abstract

In simple terms, a rubber-to-metal component is a vulcanized rubber block bonded to metal (or plastic), used to join components or structures that must be isolated from noise and vibration. In practice, reaching an effective compromise between durability, safety and comfort when designing each RTM component to suit a specific vehicle model and purpose involves many complex considerations. This leads to unique rubber/additive recipes and product designs to tune dynamic properties while also meeting requirements such as high fatigue strength, resistance to ageing, temperature resistance and recyclability. In addition, vehicle safety systems such as anti-lock braking and traction control can only function perfectly if all suspension components are in faultless condition. Wear in the strut mounts May leads to increased vibration, longer braking distances, or stiff/non-self-centering steering, symptoms that usually develop gradually and go unnoticed by the vehicle owner until a knocking noise prompts investigation [10]. Where possible without dismantling, visual inspection may reveal folds or cracks in the surface of the rubber (see pic, below) or the rubber detaching from the metal. They also create higher loads on new shock absorbers and other suspension components such as drop links, which then wear more rapidly. Therefore motivation for this research is to increase fatigue life of rubber isolator so that there is increase in the life of strut mount of Honda CRV SUV (model no: EX-L 4WD).

1. INTRODUCTION

The vehicle suspension system is responsible for driving comfort and safety as the suspension carries the vehicle-body and transmits all forces between body and road. From a design point of view, there are two main categories of disturbances on a vehicle namely the road and load disturbances. Road disturbances have the characteristics of large magnitude in low frequency (such as hills) and small magnitude in high frequency (such as road roughness). Load disturbances include the variation of loads induced by accelerating, braking and cornering. Therefore, a good suspension design is concerned with disturbance rejection from these disturbances to the outputs. A conventional suspension needs to be “soft” to insulate against road disturbances and “hard” to insulate against load disturbances. Consequently, the suspension design is an art of compromise between these two goals. There is an increasing interest within the automotive industry in the ability to produce models that are strong, reliable and safe whilst also light in weight, economic and easy to produce. Aluminium alloy has the advantage of lower weight and therefore, has been used increasingly in automotive industries for the last 30 years, mainly as engine block, engine parts, brake components, steering components and suspension arms. The increasing use of Aluminium alloy is due to the safety, environmental and 2 performance benefits that aluminium offers, as well as the improved fuel consumption because of light weight. That is why aluminium is the fastest growing material in the automobile industry.

Recently commercial finite element packages have been readily available and their utility has increased with the development of super computers. The finite element method (FEM) provides a relatively easy way to model the system. Design of a robust suspension lower arm is crucial to the success of manufactured the car and requires that suspension components have to be well in aspects of both compactness and crashworthiness, which is defined as a measure of the whole vehicles. The mechanical system is replaced by an equivalent constrained system of particles and then the laws of particle dynamics are used to derive the equations of motion. Modeling and simulation are indispensable when dealing with complex engineering systems.

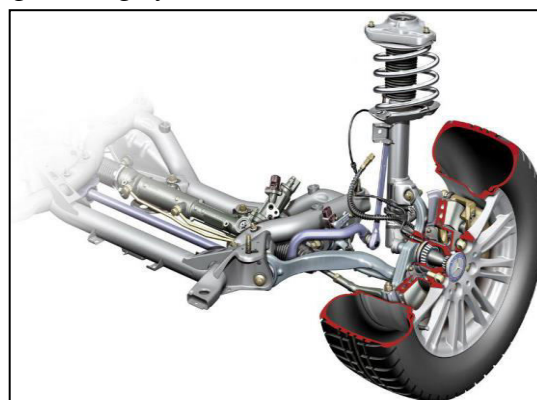


Figure 1: Suspension Arm

It makes it possible to do an essential assessment before systems are developed. It can alleviate the need for expensive experiments and provide support in all stages of a project

from conceptual design, through commissioning and operation. The most effective way to improve product quality and reliability is to integrate them in the design and manufacturing process. Statistical design of experiments refers to the process of planning the experiment so that the appropriate data can be analyzed by statistical methods, resulting in valid and objective conclusions.

2. LITERATURE REVIEW

- I. Kumar, Nithin and et al simulate the mechanical behavior of a control arm under certain load and boundary conditions by using finite element method. In this procedure, control arm is fixed its connection points as boundary condition and the ball joint is subjected to different load condition as load from tire first comes to ball joint. The main aim of this test is to obtain the stiffness and stress condition, enabling one to determine buckling load by monitoring stress, state and energy absorbed in component for prediction of crash worthiness performance. Since deformations on control arm exceeds elastic limit, the analysis performed as nonlinear. Material data obtained from engineering stress-strain curve and converted into true stress-strain values. The procedure requires only plastic part of strain values are used. Because of this reason buckling and permanent set test is simulated in ABAQUS software and stress-plastic strain values were obtained. In analysis of the control arm, the results of buckle load, stress state, stiffness condition and permanent set in ball joint found comfortably in target. The overall results of the study of the JSH 590B material have higher stress, stiffness, permanent set and buckling when compared to presently used material like FB560 and FB 590.
- II. V. Veloso, H.S. Magalhães, et al gives a failure analysis of a longitudinal stringer of a prototype vehicle has been carried. Failure took place at the bumpers fixation points of the vehicle suspension during durability tests. Crack was created and has grown causing fracture of the component. Stress analysis was performed using finite element method. A reinforcement model to solve the problem was proposed. Experimental quasi-static and durability tests were carried out and failures were no longer observed.
- III. Abdelhamid Saoudi and Mohamed Bouazara gives the Fatigue Failure Study of the Lower Suspension Vehicle Arm Using a Multiaxial Criterion of the Strain Energy Density. The objective of this study is to evaluate the potential of light alloy mechanical part use in automobile industry by studying their fatigue life using various parameters such as effect of suspension dynamic, excitation type, geometry and mechanical part weight. The studied part is the lower suspension arm made from 7075-T6 aluminium alloy. The strain density energy approach enables us to compare two same order tensor: the multiaxial and uniaxial cases. The random displacement excitation is obtained analytically from the power spectral density PSD. The force excitation is obtained by a simple normalization of

- spectrum displacement. To avoid the use of Newton-Raphson method during the partial fatigue life calculation step in all mesh elements, a Matlab interface to identify the critical elements is developed. Rain flow cycles are extracted using Markov formulation in order to calculate the number of signal repetitions to failure, which is calculated from Miner law.
- IV. N.A. Kadhimi, N. Nikabdullah, et al studies the experimental and simulation durability assessment for automotive lower suspension arm. In engineering, there is a type of failure which is called fatigue and caused by the repeated loading of components. This type of failure has been investigated under service signals for one of the critical automotive components represented by the lower suspension arm. The fatigue tests were conducting for the SAE 1045 steel based strain-controlled. A fatigue test under constant amplitude loading has been carried out to specify the material mechanical properties of the used material then the results were provided for the finite element code. The finite element fatigue life were evaluated and compared with the experimental results. The accuracy and efficiency of the numerical models are demonstrated. Finally, it is suggested that the approach presented in this chapter can be used for initial fatigue analysis and more suitable fatigue prediction models under service loadings need to be developed.
- V. SagarDarge, S.C. Shilwant, et al gives the Finite Element Analysis and Topography Optimization of Lower Arm of Double Wishbone Suspension Using Abacus and Optistruct software. The vehicle suspension system is responsible for driving comfort and safety as the suspension carries the vehicle-body and transmits all forces between body and road. Structure optimization techniques under static load conditions have been widely used in automotive industry for lightweight and performance improvement of modern cars. However, these static load conditions could not represent all the severe situations of automobile parts which subjected to complex loads varying with time, especially for lower control arm of front suspension. This paper deals with Finite Element Analysis of the Lower arm suspension of double wishbone suspension which consist the stress optimization under static loadings. Lower arm suspension has been modeled using unigraphics .In first stage of analysis area of maximum stress was identified. These analyses were carried using Altair Hyper works and solver used is Abacus. In order to reduce stresses and to improve structural strength Topography optimization approach is carried out in Hyper works in which a design region for a given part is defined and a pattern of shape variable-based reinforcements within that region is generated to increase Stiffness.
- VI. Y. Nadota*, V. Denierb, et al studies the fatigue failure of suspension arm using experimental analysis and multiaxial criterion. An experimental device has been developed to study fatigue phenomena for nodular cast iron automotive suspension arms. On the base of a detailed fracture analysis, it is shown that the major parameter influencing fatigue failure of casting components are casting defects: the

High Cycle Fatigue behaviour is controlled mainly by surface defects such as dross defects and oxides while the Low Cycle Fatigue is governed by multiple cracks initiated independently from casting defects. A methodology is proposed to define the maximum defect size allowable in a casting component. It correlates the empirical method proposed by Murakami to determine the evolution of the fatigue limit with defect size and a multiaxial endurance criterion based on the Dang Van model. The junction between the two approaches gives a concurrent tool for the fatigue design of casting components. Validation of the proposed approach gives encouraging results for surface defects and constant amplitude proportional loading.

- VII. Parvir E. Nikraves, Cwanguhuncimetalgives the Ride And Stability Analysis 0~ A Sports Car Using Multibody Dynamic Simulation. This paper summarizes the joint coordinate formulation for automatic generation of the equations of motion for dynamic analysis of multibody systems. A computer program based on this formulation is used to model a sports car and simulate its dynamic response in several driving scenarios. The model contains necessary elements of the suspension system such as the leaf springs, shock absorbers, bushings, tie rods, and roll stabilizer bars. An analytical model of the pneumatic tires is incorporated in the model to determine all of the necessary interacting forces and moments between a tire and the road. Results from some selected simulations are shown.

From the literature review it is concluded that,

- i.) Analysis to be carried out using CAE software in order to reduce stresses and to improve structural strength.
- ii.) Finite Element Analysis of the Lower Suspension Arm, steering knuckle, connecting rod consist the stress optimization under static loadings, and identification of maximum stress area.
- iii.) Topography optimization approach used to increase the stiffness and weight reduction of the component by addition of ribs and removal of material from low stress location.
- iv.) Analysis is done to check the effect of variation in the significant design parameter with suitable boundary conditions.
- v.) Computational method (CAE software) is identified as the prospective methodology to find effect of weight reduction in steering knuckle, suspension arm, and connecting rod.

3. PROBLEM DEFINITION

The suspension arm also called Wishbone or Control Arm in the suspension system of an automobile is required to take up shock loads while the vehicle is in motion. The component remains in a state of suspension while being hinged between the chassis and the hub carrying the wheel. This part is subjected to stresses on account of the loads acting on its pivoted joints while keeping the wheels from swerving uncontrollably when the

road conditions are not smooth. Since the design of the part allows for absorbing the shocks while keeping the wheels firmly in place for a steadier ride, the part itself experiences structural challenges to resist failure.

Any instance of failure writes down the goodwill of the company while adding to maintenance bills of the customer. An unforeseen eventuality could expose the occupants of the vehicle to danger of life and injury as the arm directly controls the swerving of the wheels. A new design variant of the suspension arm needs to be introduced for a premium brand of passenger car. The existing suspension arm could be evaluated as a benchmark component while proposing improved variant complying to the structural integrity with stresses below the yield point of the material.

4. OBJECTIVES / SCOPE

- i.) Study the working of Suspension arm, material properties, loads, connections and its design of the existing model.
- ii.) FE modeling of suspension arm using Altair Hyper Works
- iii.) Study the stresses developed in benchmark geometry of suspension arm
- iv.) Experimental testing of the benchmark geometry to validate the results obtained by the Computational methodology
- v.) Modifying the geometry while referring to the results for the benchmark variant
- vi.) Recommendation of suitable alternative design.

5. METHODOLOGY

I. Numerical / Computational Method-

In this method CAD model will be secured from the Design department for performing FE analysis. FE modelling will be completed using Hyper Mesh as a pre-processor. FE modelling consist of meshing, assigning material properties and load/ boundary conditions, suitable cards as per type of analysis. Radioss or any other similar suitable software will be used for as a solver. Results will be studied using post-processor such as HyperView.

II. Analytical Method-

Load acting on suspension arm can be calculated using mathematical calculations. Also, stress and displacement can be calculated approximately using this methodology.

Calculating Static Loads on the Vehicle:

Weight of vehicle acting at its center of gravity

$$G = m \times g$$

As we know approximately 0.39% of weight of the whole body or car is carried by front and 0.61 % weight carried by rear wheels.

So reaction equation is

Reaction on front wheels is $R1 = 0.39 \times G$

Reaction on rear wheel is $R2 = 0.61 \times G$

So equation becomes $R1 S1 = R2 S2$

As we know that $S = S1 + S2$

Load on front axle and rear axle are found by using equilibrium equation

$$Gfa = G \times S2/S$$

$$Gra = G \times S1/S$$

$$Gfaw = Gfa/2$$

G – Weight of vehicle acting at CG

m – Mass acceleration due to gravity

R1- reaction on front wheels

S1 – distance between CG and front axel

R2 reaction on rear wheels

S2 distance between CG and rear axel

S wheel base

GFA load on front axle

GRA load on rear axle

GFAW Loads on one wheel of front axle

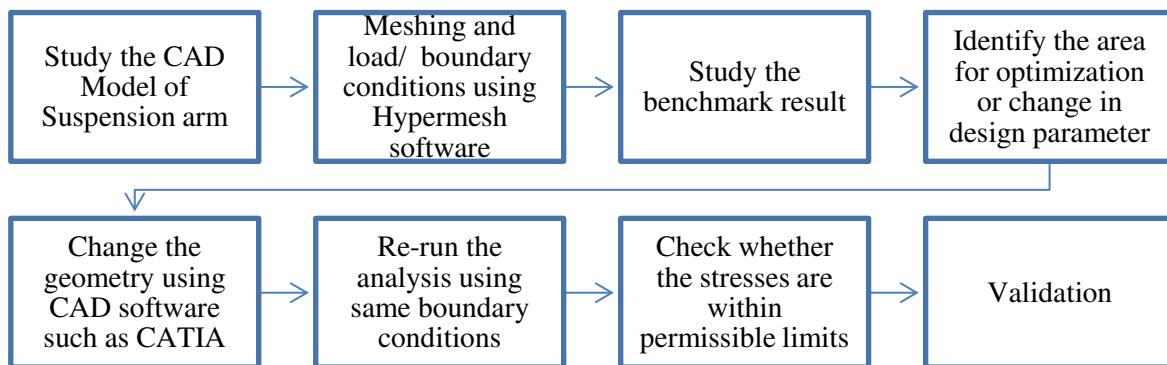


Figure2.Flow chart for steps in Computational Method

6. EXPERIMENTAL METHOD

The test setup involves Special Purpose Machine installed with load cells and proprietary software. For locating and holding the component, a provision of suitable fixture needs to be done. The machine shall record the load vs deflection characteristics for the component under test. Stiffness of the component can thus be found using this experimental setup. Numerical treatment shall be offered limited to generating inputs for the Computational problem followed by test using physical experimentation.



Figure3: Special Purpose Machine for Testing

Validation:

The experimental results shall be documented and compared for validating the analytical approach of solving the problem. Validation of the benchmark variant for comparing the results obtained from Numerical method. Comparison of results of weight reduction with reference to benchmark geometry of suspension arm.

7. CONCLUSION & FUTURE SCOPE

From the literature review it is concluded that suspension arm plays an important role in the suspension system. Causes of failure in suspension system can be traced to the static and dynamic loading due to road conditions. Stresses could be evaluated with the help of FEA tools resulting in reduced cost of experimentation. Alternatives could be assessed using FEA analysis for faster results and lower expense compared Experimental method. Only one variant could be tried out for effecting validation.

For stage 2 - Stresses developed in the suspension arm under given load and boundary conditions shall be evaluated using numerical methodology. Benchmark Analysis shall be done to peg the expectations followed by analysis for the alternatives. The alternatives shall be based on the Design parameter of 'Geometry' which shall involve change in the shape and or size to simplify the design or process.

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Stress Analysis For Fasteners Through CAE With Added Insights In Design

Paper ID	IJIFR/V3/ E10/ 040	Page No.	3943-3949	Subject Area	Mechanical Engineering
Key Words	Fasteners, FEA, Shear strength, Altair HyperWorks				

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Abstract

It is becoming increasingly important to accurately predict the behavior of bolted joints. This research work would be focused particularly on the stress concentration that develops at the root of the loaded threads, when the bolts are loaded statically with uniaxial external loads. Historically, the value of the bolt as a fastener is very great. Bolted joints have been used in a wide range of engineering structures for hundreds of years. Bolted joints are widely used in industries e.g. pressure vessels, automobiles, machine tools, home appliances and so on. It is also likely that bolted connections will continue to grow in usefulness in the future. Bolted joints are most commonly used components in machines and structures. The fasteners generally represent the largest single cause of the warranty claims faced by the automobile manufactures often potential durability problems in the machine or structures are proportional to the number of bolted joints used.

1. INTRODUCTION

The inclusion of bolted joints in aircraft structures leads to regions of stress concentration. Composite materials are relatively brittle and typically offer limited stress relief through localized yielding compared to metals. This, combined with inadequate failure prediction capabilities, can lead to conservatively designed composite bolted joints which amount to

severe structural weight penalties. Bonded joints offer higher structural efficiency, but limit accessibility and can increase manufacturing and maintenance costs. Optimizing composite bolted joints using improved modeling tools thus continues to be a priority for airframe manufacturers. Countersunk fasteners are of particular interest for use in skin-structure joints where aerodynamic efficiency is important. Many of these joints are single-lap in nature.

Single-lap joints result in significant stress concentrations and lower bearing strengths compared to double-lap joints, while countersunk joints clearly involve a highly complex stress distribution in the laminates. Thus countersunk, single-lap joints are of critical importance to the aircraft industry, but are also the most complex type to analyze. To date, there have been few detailed studies on this type of joint.

2. RELEVANCE

The contemporary demands in different branches of Engineering - Aerospace, Automotive, Naval, etc. - require application of new multi-component materials and structural systems. An appropriately chosen joining technology can offer significant enhancement of structural system performance in terms of effectiveness, reliability, safety and other design criteria. The modern applications of joints (e.g. bonded/riveted, bonded/bolted, etc.) are of great technological interest as they permit to combine and to enhance the individual performance of each kind of joint. This is of great importance for in different branches of engineering such as aerospace, mechanical and civil. The advantages to be explored could be in the form of : Higher static and fatigue strength; Stiffer structure; Two-stage cracking process before the final failure, first in the adhesive layer and then in the rivets; Better corrosion resistance.

3. LITERATURE REVIEW

Kei Sawata (2015) Strength of bolted timber joints subjected to lateral force the safety and serviceability of timber structures are frequently governed by the performance of joints. Bolted joints are a very commonly used form of joints and are effective from the viewpoint of the load-slip characteristics when subjected to a lateral force. The shear strength of a bolted joint is affected by various factors. Some of the factors affecting the shear strength of a bolted joint are classified into four categories in this paper: the material characteristics, geometrical factors, assembly conditions for the bolted joint, and factors that act during its service. This paper reviews the effects of these factors on the shear strength of a bolted joint. Numerous experimental studies were performed on the shear strength of a bolted joint. The effects of these factors on the shear strength varied according to the kind of shear strength and loading direction to the grain. In addition to the experimental investigations, analytical investigations to estimate the shear strength of a bolted joint are also discussed in this paper. Estimations of the yield strengths of bolted joints have been performed by numerous researchers; and in recent years, there has been an increase in studies to predict the load at failure.

Liu Long-quan, Chen kun-kun (2014) Numerical Method on Load Sharing Problem of Thick Laminate Joints Accurately and efficiently predicting the load sharing of multi-bolt thick laminate joints is necessary to quicken the optimization of the large-scale structures over various design variables, and a two-dimensional (2D) finite element method (FEM) is introduced to meet such a demand. The deformation contributions of the joint zone are analyzed and calculated separately, including the shearing deformation of the fasteners shank, the bending deformation of the fasteners shank, and the bearing deformation of the fasteners and joint plates. These deformations are all transferred and incorporated into the components of the fastener's flexibility. In the 2D finite element model, the flexibilities of the beam elements and bush elements are used to simulate different components of the fastener's flexibility. The parameters of the beam elements which include the bending moment of inertia and intersection area, and the parameters of the bush elements which include the stiffness in different directions, are all obtained through equalizing the fasteners flexibilities. In addition, the secondary bending effect introduced by the single-lap joints is also taken into account to verify the flexibilities of the fasteners in practical application. The proposed FEM is testified to be more accurate than the traditional 2D FEMs and more efficient than the three-dimensional (3D) FEM in solving load sharing problem of multi-bolt single-lap thick laminate joints. With the increase of joint plates' thickness, the advantages of the proposed method tend to be more obvious. The proposed 2D FEM is an effective tool for designing bolted joints in large-scale composite structures.

Yong Hyun Cho, Seung Hun Kim (2014) Structural Behaviors and Curling Influence of Singles hear Bolted Connections with Aluminium Alloys (7075-T6) Experimental study has been performed to investigate the structural behaviors of single shear bolted connections fastened with aluminium alloys (7075-T6). End distance parallel to the direction of applied force was chosen as a main variable. Some specimens with a relatively short end distance failed by typical shear-out fracture and curling (out-of-plane deformation) in the perpendicular direction to loading was also observed for the others with a long end distance. The curling caused a temporary strength drop during test and test ultimate strengths were compared with those predicted by finite element analysis results. The validity of finite element analysis (FEA) for predicting the structural behaviors of bolted connections was verified and strength reduction ratio by curling was estimated quantitatively.

Chen Kun-Kun, Wang Hai (2013) Analysis of Through-the-Thickness Stress Distribution in Thick Laminate Multi-Bolt Joints Using Global-Local Method. The stress distribution surrounding the fastener hole in thick laminate mechanical joints is complex. It is time-consuming to analyze the distribution using finite element method. To accurately and efficiently obtain the stress state around the fastener hole in multi-bolt thick laminate joints, a global-local approach is introduced. In the method, the most seriously damaged zone is 3D modeled by taking the displacement field got from the 2D global model as boundary conditions. Through comparison and analysis there are the following findings: the global-local finite element method is a reliable and efficient way to solve the

stress distribution problem; the stress distribution around the fastener hole is quite uneven in through-the-thickness direction, and the stresses of the elements close to the shearing plane are much higher than the stresses of the elements far away from the shearing plane; the out-of-plane stresses introduced by the single-lap joint cannot be ignored due to the delamination failure; the stress state is a useful criterion for further more complex studies involving failure analysis.

D. Valladares, M. Carrera, L. Castejon (2013) Development of a Numerical Technique for the Static Analysis of Bolted Joints by the FEM The use of numerical simulation tools applying the finite element method for the design and analysis of bolted joints involves a series of difficulties providing complexity to the numerical modeling of apparently simple mechanical systems. In order to solve these difficulties and to achieve accurate, effective and fast calculations, it is necessary to take into account several simplifications of the mesh models during the pre-process step. Factors such as the substitution of the bolts and nuts' threads for contact conditions with friction interaction between cylindrical surfaces, the adequate characterization of the preload existing in the different members of the joint, or the correct modeling of contact interactions between the parts suppose a series of problems that will be necessary to overcome so as to successfully face the analysis of a mechanical system with bolted joints subjected to load conditions. The aim of this paper is the development of a numerical technique for the static analysis of preloaded bolted joints by the FEM using the software ABAQUS Standard and a mesh modeling with solid type elements. Parting from a new design with bolted joints for the longitudinal beams of an innovative modular semitrailer, the different problems associated to this type of analysis were stated first. Then, the numerical technique developed has been described and all its considerations have been applied to that specific semitrailer bolted joints.

4. PROPOSED WORK

The aim of this work is to compare the various types of assembly techniques and harness the same for fastening the elements together. The standard fitments frequently observed would be benchmarked for analysis and the dissertation work would then focus on typical application/s experienced by the client. Design applications for a particular type of joining method can be suggested on following basis:

- Material of the elements to be joined
- Packaging and space constraints
- Geometry for the elements
- Boundary conditions for the mating parts
- Type and magnitude of loads acting on the assembly
- Specific requirements to be addressed as a part of corporate / regulatory compliance

The study will focus on modifying few of above stated parameters to suggest improvements in existing method of fastening. First, study will focus on studying existing design and based on observations, design improvements will be suggested. Modified design will be tested using FEM software for deflection, impact force and stress

distribution. Results of modified fastener configuration/ assembly of the elements will be compared against existing design. FEM is backbone of today's automotive industry. In recent time FE analysis is widely used to validate the complex designs. Use of FEA not only reduces product development time but also saves lot of cost. Hence, this work proposes FE analysis to validate the design modifications.

5. OBJECTIVES

To study existing configuration of assembly and the method of fastening

- Carry out structural analysis for stresses induced by tensile/ torsion/ shear loads
- To identify suitable method of fastening (threaded fasteners/ rivets/ spot welded joints/ adhesives etc.)
- To review the proposed modifications
- To evaluate the modified design using FEA
- Testing and experimentation

6. METHODOLOGY

FEA tools and techniques are being proposed for addressing the nuances of the given application while optimizing the needs of the overall project.

■ Finite Element Analysis

Finite element method is used to analyze structures by computer simulations and therefore it helps to reduce the time required for prototyping and to avoid numerous test series. The modeling and analysis will be done using Finite element Analysis software.

■ Steps for finite element analysis:

FEA is mainly divided into three following stages:

- Preprocessing
 - Creating the model.
 - Defining the element type
 - Defining material properties
 - Meshing
 - Applying loads
 - Applying boundary conditions
- Solution: Assembly of equations and obtaining solution
- Post processing: Review of results such as deformation plot, stress plot etc.

7. EXPERIMENTATION

The experimental program would consist of the estimation of the mechanical properties of the components involving the threaded fasteners and the mechanical response determination of the same upto final failure. The considered joints are planned for subjecting to uni-axial tension and/or shear. The test setup would include variants for the

sheet/ plate to be joined of the same/ different materials. Appropriate type of the fastener to be selected along with suitable specs (material and size). Tests to be conducted based on the projected real-time conditions to be experienced by the application. Typically, tensile tests/ Shear Tests are expected to be experienced by the application.

8. VALIDATION

By comparing the experimental results and computational results of the benchmark model validation would be completed.

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